PB86-236767

Guidance for the Reregistration of Pesticide Products Containing Copper Sulfate (008181) as the Active Ingredient

(U.S.) Environmental Protection Agency
Washington, DC

Mar 86

U.S. Department of Commerce
National Technical Information Service
NTIS

GUIDANCE FOR THE REREGISTRATION OF PESTICIDE PRODUCTS CONTAINING AS THE ACTIVE INGREDIENT

COPPER SULFATE
(008181)

CASE NUMBER 0636

CAS 1344-73-6

ENVIRONMENTAL PROTECTION AGENCY

OFFICE OF PESTICIDE PROGRAMS

WASHINGTON, D. C. 20460

March 1986

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

50272-101

REPORT DOCUMENTATION PAGE

1. REPORT NO.

2.

3. Recipient's Accession No. PB86 236767/AS

4. Title and Subtitle
Guidance for the Reregistration of Pesticide Products Containing Copper Sulfate as the Active Ingredient.

5. Report Date
Issued March 1986

6.

7. Author(s)
EPA, Office of Pesticide Programs, Registration Division

8. Performing Organization Rept. No.
540/RS-86-129

9. Performing Organization Name and Address
US Environmental Protection Agency
Office of Pesticide Programs
Registration Division TS-767C
401 M Street, SW
Washington, D. C. 20460

10. Project/Task/Work Unit No.

11. Contract(C) or Grant(G) No.
(C)
(G)

12. Sponsoring Organization Name and Address
Same as #9

13. Type of Report & Period Covered

14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

This document contains information regarding the reregistration of pesticide products containing the subject active ingredient. The document includes how to register under a registration standard, regulatory position and rationale, and summaries of data requirements and data gaps. Also included is a bibliography containing citations of all studies reviewed by EPA in arriving at the positions and conclusions contained in the standard.

17. Document Analysis a. Descriptors
Pesticides, standards, regulations, manufacturing, chemistry, toxicology, residues, ecology, path of pollutants.

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement
Publicly Available

19. Security Class (This Report)
Unclassified

20. Security Class (This Page)
Unclassified

21. No. of Pages
231

22. Price

(See ANSI–Z39.18)

See Instructions on Reverse

OPTIONAL FORM 272 (4–77)
(Formerly NTIS–35)
Department of Commerce

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INTRODUCTION

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA sec. 3(g)) directs EPA to reregister all pesticides as expeditiously as possible.

To carry out this task, EPA has established the Registration Standards program, which will review all pesticide products containing active ingredients first registered before January 1, 1977. Pesticides will be reviewed in use clusters which have been ranked to give earliest review to pesticides used on food and feed crops.

The Registration Standards program involves a thorough review of the scientific data base underlying pesticide registrations and an identification of essential but missing studies which may not have been required when the product was initially registered or studies that are now considered insufficient. EPA's reassessment results in the development of a regulatory position, contained in a Registration Standard, on each pesticide and its uses. The Agency may require the registrant to modify product labels to provide additional precautionary statements, restrict the use of the pesticide to certified applicators, provide reentry intervals, modify uses or formulation types, specify certain packaging limitations, or other requirements to assure that proper use of the pesticide will not result in unreasonable adverse effects on the environment.

The scientific review, which is not contained in this Guidance Package but is available upon request, concentrates on the technical grade of the active ingredient and identifies missing generic data. However, during the review of these data we are also looking for potential hazards that may be associated with the end use (formulated) products that contain the active ingredient. If we have serious concerns, we will address end use products as part of the Registration Standards program and will propose regulatory actions to the extent necessary to protect the public.

EPA has the authority under FIFRA sec. 3(c)(2)(B) to require registrants to submit data that will answer our questions regarding the hazard that may result from the intended use of a pesticide. Although sec. 3(c)(2)(B) provides that all registrants are responsible for these data, the Agency generally imposes generic data requirements only on the registrants of the manufacturing use products (basic suppliers of the active ingredient) and other producers who do not qualify for the formulator's exemption.*

A producer who wishes to qualify for the formulator's exemption may change his source of supply to a registered source, provided the source does not share ownership in common with the registrant's firm. A registrant may do so by submitting a new Confidential Statement of Formula, EPA Form 8570-4, identifying the registered source of the active ingredient, to the appropriate Product Manager within 90 days of receipt of this Guidance Document. The chart on the following page shows what is generally required of those who do and do not qualify for the formulator's exemption in the Registration Standards program.

If you decide to request the Agency to cancel the registration of any of your products subject to the requirements of this Guidance Document, please notify the Product Manager named in the cover letter, within 90 days from the receipt of this document. If you decide to maintain your product registration(s), you must provide the information described in the following pages within the timeframes outlined. The Agency may issue a notice of intent to cancel or suspend the registration of any currently registered product which does not comply with the requirements set forth in this Guidance Document.

You are reminded that FIFRA sec. 6(a)(2) requires you to submit factual information raising concerns of possible unreasonable adverse effects of a pesticide. You should notify the Agency of interim results of studies in progress if those results show possible adverse effects.

*The formulator's exemption applies to a registrant of an product if the source of his active ingredient(s): (1) is a registered product and (2) is purchased from a source which does not have ownership in common with the registrant's firm.

PRODUCTS SUBJECT TO THE REGISTRATION STANDARDS PROGRAM	ACTION(S) REQUIRED TO MAINTAIN REGISTRATION
I. Products That Do Not Qualify For The Formulator's Exemption	
A. Single Active Ingredient Products*	These products must be reregistered. To obtain reregistration, labeling, packaging and data requirements must be satisfied in accordance with the Registration Standards Guidance Document.
B. Multiple Active Ingredient Products	These products will not be reregistered at this time. However, generic data required to continue the registration of the active ingredient under review, as described in the Registration Standards Guidance Document, will be required and some labeling precautions may also be required.
II. Products That Do Qualify For The Formulator's Exemption	Only when additional restrictions or labeling are needed to protect man or the environment will these products be subject to the Registration Standard requirements. Affected products will be dealt with in a variety of ways, including but not limited to the Label Improvement Program and special intent to cancel notices.

* End use products of registrants who also produce a manufacturing use product will not be required to be reregistered provided that registrant fulfills the requirements specified in the Guidance Document for manufacturing use product(s). Such end use products will be subject to the labeling changes required for products in "II" above. If there are no manufacturing use products registered by any company end use products will be required to be reregistered.

NOTE: If all registrants in "I" above fail to meet the requirements in I-A and B above, then the registrants in "II" lose their right to qualify for the formulator's exemption and become subject to the requirements in I-A and B.

I. REGULATORY ASSESSMENT

A. INTRODUCTION

This Registration Standard describes the regulatory position and rationale for all registered manufacturing-use products (MPs) containing copper sulfate as the sole active ingredient. This Standard also will require significant changes on the labels of some other EPs. The Agency bases its position and rationale on an evaluation of all MPs, EPs, and Section 3, 24(c) and intrastate uses registered for copper sulfate. After briefly describing the chemical and its uses, this chapter presents the regulatory position and rationale, the criteria for registration, acceptable ranges and limits, labeling considerations and tolerance reassessment.

B. DESCRIPTION OF THE CHEMICAL

Copper sulfate is the common name developed through long usage and the name used in this Standard to represent the active ingredient in the pentahydrate, monohydrate and basic copper sulfate forms. Other names for the pentahydrate are bluestone, blue vitriol, Salzburg vitriol, Roman vitriol, and blue copperas. Basic copper sulfate is marketed under various trade names, including BSC Copper Fungicide, CP Basic Sulfate, and Tri-Basic Copper Sulfate. The Chemical Abstracts Service (CAS) number for copper sulfate is 1344-73-6 and the EPA Chemical Code number is 024401 for the pentahydrate form, 024402 for the monohydrate form, and 008101 for basic copper sulfate.

Copper sulfate is an odorless blue or green-white powder or crystalline solid. The empirical formula is $CuSO_4.5H_2O$ (pentahydrate); $CuSO_4.H_2O$ (monohydrate) and $CuSO_4$ (anhydrous). The molecular weight is 249.69 (pentahydrate); 177.62 (monohydrate); and 159.61 (anhydrous). Upon heating, the pentahydrate form loses 4 mol H_2O at 110°C and all 5 mol H_2O at 250°C. The resulting anhydrous form is stable up to 650°C.

Solubility of copper sulfate pentahydrate is 31.6 g/100 cc at 0°C and 203.3 g/100 cc at 100°C in water and 15.6 g/100 cc at 18°C in methanol. For the anhydrous form, solubility in water is 14.3 g/100 cc at 0°C and 75.4 g/100 cc at 100°C; in methanol solubility is 1.04 g/100 cc at 18°C. Both forms are insoluble in ethanol.

Formulations of basic copper sulfate include a 53 percent technical, dusts ranging in concentration from 2.0 to 52.0 percent a.i., wettable powders ranging in concentration from 4.0 to 53 percent a.i., and fluid concentrates ranging from 0.11 to 4.24 lb a.i./gallon. Formulations of copper sulfate monohydrate include 10 to 20 percent a.i. dusts, an 11 percent a.i. granular and a 27.7 percent a.i. soluble concentrate. Formulations of copper sulfate pentahydrate include 15, 99, and 99.5 percent a.i. technical products, a 50 percent a.i. formulation intermediate, 20 and 75 percent a.i. granulars, crystalline formulations ranging from 93.75 to 100 percent a.i., soluble concentrate/solids ranging from 25.5 to 99 percent a.i., soluble concentrate/liquids ranging from 8.5 to 15.1 percent a.i., and ready to use products ranging from 0.76 to 15.0 percent a.i..

Basic copper sulfate is registered as an herbicide and a fungicide. Registered sites for herbicidal use include pecans, live oak, ornamental woody shrubs, and ornamental and/or shade trees. Registered sites for fungicidal use are too numerous to list here, but are listed in the attached Index of Pesticidal Uses. Copper sulfate monohydrate is registered (as a combination with hydrated lime) as a fungicide for application to numerous agricultural crops. Copper sulfate pentahydrate is registered as an algicide, a molluscicide an agricultural fungicide when used with lime, and as an industrial fungicide when used alone. Registered sites for the molluscicidal use include freshwater aquaria, artificially impounded water and rice paddies. Registered agricultural sites for the fungicidal use are too numerous to list here, but are listed in the attached Index of Pesticidal Uses. Non-agricultural sites for the pentahydrate used alone include wood, sewer systems, papermills, and cooling towers.

Copper sulfate is active against a range of foliar pathogens that attack fruits and vegetables. It is generally less effective than most widely available organic protectants and systemic fungicides. Copper sulfate has some limited activity against bacterial pathogens. One of the limiting factors in the use of copper compounds is their serious potential for phytotoxicity. The mode of action involves the inactivation of most fungal enzyme systems and protein precipitation. An excess of copper sulfate kills algae by causing an imbalance with other enzyme metal cofactors resulting in enzyme blockage.

An estimated 8,295,000 pounds (a.i.) of copper sulfate and hydrates are used annually in the United States. Of the total amount of all types of copper sulfate applied in the United States in 1982, approximately 36% and 26% were applied to oranges and tomatoes, respectively. Between 1 and 10 percent were applied to walnuts, grapefruits, almonds, pears, lemons, potatoes, tobacco, and grapes. Less than one percent was applied to peaches, cherries, beans/peas, peanuts, applies, rice, sugarbeets, lettuce, pecans, olive, nectarines, plums, cauliflower, apricots, strawberries, onions, celery, and wheat. Approximately 18,000 lbs a.i. are used annually for algae control and 15,000 lbs a.i. for control of vegetation on rights-of-ways.

The method of application of copper sulfate depends on the formulation and use. For ground applications, equipment varies from dusters to boom sprayers and airblast applicators. For homeowner use, hand held equipment such as compressed air sprayers, and paint brushes are used. For use in impounded waters, lakes, ponds, reservoirs and irrigation and drainage conveyance systems, application may be by spraying or dusting the water surface or towing a burlap bag of large crystals behind a boat, by dumping large crystals, by continuously metering finer crystals into flowing water by a specially designed feeder, or by aerial application. Application rates range from 0.0013 to 10.0 ppm for aquatic uses and from 0.24 to 21.2 lb ai/A for terrestrial uses.

C. REGULATORY POSITION AND RATIONALE

Based on a review and evaluation of all available data and other relevant information on copper sulfate, the Agency has determined the following:

1. Manufacturing-use pesticide products containing copper sulfate as the sole active ingredient may be registered for sale, distribution, reformulation, and use, subject to the terms and conditions of this Standard. Registrants must provide or agree to develop additional data, as specified in Table A, in order to maintain existing regulations or permit new copper sulfate registrations.

   Rationale: The copper sulfate data base is incomplete, but the Agency is not aware of any evidence of hazard to human health or the environment that would warrant cancellation or suspension of products at this time. Issuance of this Standard provides a mechanism for identifying data needs. The required data will be reviewed and evaluated and the Agency will determine at that time if they will affect the registrations of copper sulfate.

2. The Agency does not possess laboratory toxicological data meeting Agency standards for copper sulfate compounds. However, there is a substantial volume of data on copper in the literature which addresses all major biological actions. The Agency has determined that sufficient information on toxicity of copper sulfate is available from literature sources, and that toxicology studies normally required for registration are not needed. The acute toxicity of copper sulfate is adequately defined and its metabolism in humans and animals well understood.

   Rationale: Copper is ubiquitous in nature, and is a required nutritional element for both plants and animals. It is one of 26 elements found essential to life. Copper is found in the adult human body at levels of 80-150 mg. Oral ingestion of copper compounds is irritating to the gastric mucosa and emesis occurs promptly, thereby reducing the amounts of copper available for absorption into the body. Moreover, man is protected from excess body copper by an effective homeostatic mechanism, which integrates absorption, retention and excretion to stabilize the copper body burden. Only a small percentage of copper ingested is absorbed, and most of the absorbed copper is excreted.

3. Because of acute toxicity and sensitization characteristics, the Agency will require registrants to place certain precautionary statements on the labels of manufacturing-use and end-use products containing copper sulfate. The specific language of these statements is given in Section F of this Chapter.

   Rationale: Copper sulfate is only moderately toxic upon acute oral exposure (Toxicity Category II) and dermal exposure (Toxicity Category II). Ocular exposure to the granular material, however, can cause severe eye damage (Toxicity Category I). Hypersensitivity or sensitization can result from copper contact with the skin. Labels of certain products should therefore contain statements that warn applicators of copper sulfate's toxicity, give first aid instructions, and require the use of precautionary measures such as protective clothing and goggles.

4. The Agency will require registrants to submit additional data on the effects of EPs containing copper sulfate on non-target aquatic organisms. The Agency will require certain precautionary statements to be placed on EP labels for the protection of non-target aquatic organisms. The wording of these statements is provided in Section F of this Chapter.

   Rationale: Existing studies on technical copper sulfate show that it is toxic to aquatic organisms, and that indiscriminate use can lead to reductions in populations of aquatic organisms, either through direct toxicity or through the oxygen depletion that occurs when too much aquatic vegetation is killed at once. However, the limited data before the Agency at this time does not indicate that an unreasonable hazard to non-target aquatic organisms exists. Data on the toxicity of EPs and their effects on non-target aquatic organisms are needed to complete an evaluation of the hazards posed to non-target aquatic life by copper sulfate use. Precautionary label statements warning of the danger to non-target aquatic organisms will mitigate the hazard until the hazard evaluation can be completed.

5. The Agency will require that labels bear statements for the protection of certain endangered species identified by the Office of Endangered Species (OES), U.S. Department of the Interior. The statements will require that applicators consult EPA endangered species bulletins for their area before applying copper sulfates. The wording of these label statements is given in Section F of this Chapter.

Rationale: The OES has determined that the use of copper sulfates in certain areas would pose a risk to Solano Grass, the Slackwater Darter, and several species of freshwater mussels. Requiring applicators to consult EPA endangered species bulletins before applying copper sulfates in those areas will minimize the potential for exposure of those endangered species.

6. The Agency will request that the OES determine whether any endangered species, or the habitat of any endangered species, will be placed in jeopardy by the algicide uses of copper sulfate. The Agency will review other uses of copper sulfate, and, if appropriate, will refer them to OES for determinations of jeopardy to endangered species.

   Rationale: The Agency has determined that certain use patterns, particularly the algicide use, could pose problems for endangered aquatic species, because of the toxicity of copper sulfate to aquatic species. The limited data before the Agency at this time does not indicate that any unreasonable hazard to endangered species exists, but consultation with OES will allow the Agency to identify any potential hazards associated with the algicide use pattern. Agency review of the other use patterns is appropriate in light of copper sulfate's toxicity to aquatic species.

D. CRITERIA FOR REGISTRATION UNDER THE STANDARD

To be covered under this Standard, products must contain copper sulfate as the sole active ingredient, bear required labeling, and conform to the product composition, acute toxicity limits, and use pattern requirements listed in Section E of this document. The applicant for registration or reregistration of manufacturing-use products subject to this Standard must comply with all terms and conditions described in it, including submission of an up-to-date Confidential Statement of Formula, submission of revised labeling, commitment to fill data gaps on the schedule specified by the Agency and, when applicable, offer to pay compensation as required by Sections 3(c)(1)(D) and 3(c)(2)(D) of the Federal Insecticide, Sections 3(c)(1)(D) and 136 (c)(2)(D) of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), as amended, 7 U.S.C. 136(c)(1)(D) and 136(c)(2)(D). Registration applicants must contact the Agency for specific instructions, including updated information on data requirements and companies whose data have been used in support of registration.

E. ACCEPTABLE RANGES AND LIMITS

1. Product Composition Standard

To be covered under this Standard, manufacturing use products must contain copper sulfate as the sole active ingredient. Each MP formulation proposed for registration must be fully described with an appropriate certification of limits, stating maximum and minimum amounts of the active ingredient which may be present in products.

2. Acute Toxicity Limits

The Agency will consider registration of technical grade and manufacturing use products containing copper sulfate, provided that the product labeling bears appropriate precautionary statements for the acute toxicity category in which each product is placed.

3. Use Patterns

To be registered under this Standard, manufacturing use products containing copper sulfate may be labeled for formulation into end use products only for the commodities listed below. The attached index entry lists all registered uses, as well as approved maximum application rates and frequencies.

- Terrestrial, non-domestic food uses on fruit and nut crops, vegetable crops, and wheat seed treatment

- Terrestrial, non-domestic non-food uses on ornamentals and tree wounds

- Aquatic, food uses on rice and cranberries

- Aquatic, non-food uses on water systems (sewer pumps and force mains, pulp and paper mills, cooling towers, spray ponds, pole soaking treatments, control of algae and molluscs in lakes and ponds)

F. REQUIRED LABELING

All manufacturing-use copper sulfate products must bear appropriate labeling as specified in 40 CFR 162.10. The guidance package for this Standard contains information on label requirements. All labeling changes must appear on all products released for shipment by October 1, 1986. All labeling changes must appear on all products in channels of trade by October 1, 1987. In addition to the above, the following information must appear on the labeling:

1. Ingredient Statement

The ingredient statement for all crystalline formulations and solutions containing copper sulfate must list the active ingredient as one of the following:

"Copper sulfate pentahydrate*..............................XX%";

"Copper sulfate monohydrate*..............................XX%";

"Basic copper sulfate*....................................XX%".

The ingredient statement must have a footnote reading:

"*Metallic copper equivalent..............................XX%"

2. Use Pattern Statements

All manufacturing-use copper sulfate products must state that they are intended for formulation into end-use products for the aforementioned use patterns. Labeling must specify sites, which are listed in Section E.3. of this document under Use Patterns. However, no use may be included on the label if the registrant fails to agree to comply with the data requirements for that use pattern, as listed in Table A.

3. Precautionary Statements

a. Labels for manufacturing-use copper sulfate products must bear statements reflecting the compound's acute human toxicity. Copper sulfate is in Toxicity Category I by eye and dermal irritation routes of exposure.

The following human hazard statement, based on data reviewed by the Agency, must appear on all MP labels, and on the labels of all EPs in the 99% a.i. crystalline form:

> "DANGER - Causes severe eye and skin irritation. Harmful if absorbed through the skin or inhaled. May cause skin sensitization reactions in certain individuals. Avoid contact with the skin, eyes, or clothing. Avoid breathing dust. Protective clothing, including goggles, should be worn. Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash before reuse."

One of the following statements of practical treatment, based on data reviewed by the Agency, must appear on all MP labels, and on the labels of all EPs in the 99% a.i. crystalline form, under a heading that reads either "First Aid" or "Practical Treatment":

> "IF IN EYES, flush with plenty of water. Call a physician. IF ON SKIN, wash with plenty of soap and water. Get medical attention. IF SWALLOWED, call a physician or Poison Control Center. Drink 1 or 2 glasses of water and induce vomiting by touching the back of throat with finger. Do not induce vomiting or give anything by mouth to an unconscious person."; or

> "IF IN EYES, flush with plenty of water. Call a physician. IF ON SKIN, wash with plenty of soap and water. Get medical attention. IF SWALLOWED, call a physician or Poison Control Center. Drink 1 or 2 glasses of water and induce vomiting by touching back of throat with finger, or, if available, by administering syrup of ipecac. Do not induce vomiting or give anything by mouth to an unconscious person."

b. The following revised environmental hazard statement must appear on all MP labels:

> "This pesticide is toxic to fish and aquatic organisms. Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans, or public water unless this product is specifically identified and addressed in an NPDES permit. Do not discharge effluent containing this product into sewer systems without previously notifying the sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA."

c. The following statements must appear on all EP labels:

i. "May cause skin sensitization in certain individuals"; and

ii. "ENDANGERED SPECIES RESTRICTIONS

It is a violation of Federal laws to use any pesticide in a manner that results in the death of an endangered species or adverse modification of their habitat.

The use of this product may pose a hazard to certain Federally designated endangered species known to occur in specific areas within the following counties:

STATE Species (Bulletin No.)	COUNTY
CALIFORNIA Solano Grass (EPA/ES-85-13)	Solano
TENNESSEE Slackwater Darter (EPA/ES-85-04)	Lawrence Wayne Hancock
Freshwater Mussels (EPA/ES-85-07)	Claiborne Hawkins Sullivan
ALABAMA Slackwater Darter (EPA/ES-85-05)	Lauderdale Limestone Madison
VIRGINIA Freshwater Mussels (EPA/ES-85-06)	Grayson Smyth Scott Lee Washington

Before using this product in the above counties you must obtain the EPA Bulletin specific to your area. This Bulletin identifies areas within these counties where the use of this pesticide is prohibited, unless specified otherwise. The EPA Bulletin is available from either your County Agricultural Extension Agent, the Endangered Species Specialist in your State Wildlife Agency Headquarters, or the appropriate Regional Office of the U.S. Fish and Wildlife Service. THIS BULLETIN MUST BE REVIEWED PRIOR TO PESTICIDE USE."

d. All copper sulfate products intended for direct application to water must bear the following statements:

i. "This pesticide is toxic to fish. Direct application of copper sulfate to water may cause a significant reduction in populations of aquatic invertebrates, plants and fish."

ii. "Do not treat more than one-half of lake or pond at one time in order to avoid depletion of oxygen from decaying vegetation. Allow 1 to 2 weeks between treatment for oxygen levels to recover."

iii. "Trout and other species of fish may be killed at application rates recommended on this label, especially in soft or acid waters. However, fish toxicity generally decreases when the hardness of water increases."

iv. "Do not contaminate water by cleaning of equipment or disposal of wastes."

v. "Consult your State Fish and Game Agency before applying this product to public waters. Permits may be required before treating such waters."

e. All copper sulfate products intended for end use applications to water where there is likelihood of effluent reaching natural waters, i.e. cooling towers, paper or pulp mills, spray ponds, sewer pumps, force mains, algicide and molluscicide uses, must bear the following statement:

"This pesticide is toxic to fish and aquatic organisms. Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans, or public waters unless this product is specifically identified and addressed in an NPDES permit. Do not discharge effluent containing this product to sewer systems without previously notifying the sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA."

f. All copper sulfate products intended for end use on terrestrial sites must bear the following statement:

> "This pesticide is toxic to fish and aquatic organisms. Do not apply directly to water. Drift and runoff from treated areas may be hazardous to fish and aquatic organisms in adjacent aquatic sites. Do not contaminate water by cleaning of equipment or disposal of wastes."

G. TOLERANCE REASSESSMENT

Copper sulfate basic, monohydrate, and pentahydrate are exempt from the requirements of a tolerance when applied to growing crops in accordance with good agricultural practices (40 CFR 180.1001(b)(1)). There is a specific exemption from the requirement of a tolerance for copper in meat, milk, poultry, eggs, fish, shellfish, and irrigated crops when copper sulfate pentahydrate is used as an algicide or herbicide in irrigation water systems, lakes, ponds, reservoirs or other bodies of water (40 CFR 180.1021(a)). The Agency has reviewed these exemptions and they appear well-founded. Copper is a required micronutrient and is unlikely to exhibit toxic effects when individuals are exposed to small amounts.

There are a number of factors which minimize the possibility of exposure from dietary intake as a result of these uses of copper sulfate. First, copper sulfate can be washed off plants by rain and during food processing. Second, water soluble cupric ions are rapidly adsorbed by organic matter in soils. This adsorption immobilizes the ions before they become "fixed forms" in other combinations, from which they would be slowly available. Most of the copper in soil is unavailable for plant growth. Third, toxic copper levels in plants induce an imbalance with iron, producing a chlorosis similar to iron deficiency. This chlorosis causes plant dwarfing, stunted roots and decreased growth and yield. These effects occur before there are significant increases in plant copper. Thus there is a "built-in" warning to applicators, which would tend to limit excess copper application and, consequently, residue levels. Fourth, plants resist copper accumulation and translocation to stems, leaves or seeds. Most plants growing on soils containing up to 1000 ppm copper showed only a slight elevation in copper content compared to plants grown on normal soils. Fifth, crop growth normally occurs at pH 6.0-6.5. At this level the soil has a greater than normal capacity to absorb applications such as copper. Therefore, the usual practice of liming soil to bring it to the proper pH for crop production markedly increases its capacity for sequestering copper ions, thus limiting acccessibility of copper to plants.

II. REQUIREMENT FOR SUBMISSION OF GENERIC DATA

A. This portion of the guidance document is a Notice issued under the authority of FIFRA sec. 3(c)(2)(B). The tables following this section list the data required for maintaining the registrability of each product.

EPA has determined that additional generic data described in Table A must be submitted to EPA for evaluation in order to maintain in effect the registration(s) of your product(s) identified as an attachment to the cover letter accompanying this guidance document. As required by FIFRA sec. 3(c)(2)(B), you are required to take appropriate steps to comply with this Notice.

EPA may suspend the registration of each of those products unless, within the specified time, you have informed EPA how you will satisfy the requirements of this Notice. Any such suspension will remain in effect until you have complied with the terms of this Notice.

B. What Generic Data[1] Must be Submitted. You may determine which generic data you must submit by consulting Table A at the end of this chapter. That table lists the generic data needed to evaluate the continued registrability of all products, and the dates by which the data must be submitted. The required studies must be conducted in accordance with EPA approved protocols (such as those contained in the Pesticide Assessment Guidelines [2] or data collected under the approved protocols of the Organization for Economic Cooperation and Development (OECD). If you do not wish to develop data in support of certain uses appearing in your labeling, you may delete those uses at the time you submit your revised labeling.

For certain kinds of testing (generally ecological effects), EPA requires the test substance to be a "typical formulation," and in those cases EPA needs data of that type for each major formulation category (e.g., emulsifiable concentrates, wettable powders, granulars, etc.) These are classified as generic data and when needed are specified in Table A. EPA may possess data on certain "typical formulations" but not others. Product-specific data are further explained in Chapter III of this document.

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[1] Generic data pertain to the properties or effects of a particular ingredient, and thus are relevant to an evaluation of the risks of all products containing that ingredient, regardless of the product's unique composition or specific use. Product-specific data relate only to the properties or effects of a product with a particular composition (or a group of products with closely similar composition).

[2] The Pesticide Assessment Guidelines are available in hard copy or microfiche from the National Technical Information Service, 5285 Port Royal Road, Springfield, Va. 22161.

C. Options Available for Complying With Requirements to Submit Data

Within 90 days of your receipt of this Notice you must submit to EPA a completed copy of the form entitled "FIFRA Section 3(c)(2)(B) Summary Sheet" [EPA Form 8580-1, Appendix II-3] for each of your products. On that form you must state which of the following methods you will use to comply with the requirements of this Notice:

1. (a) Notify EPA that you will submit the data, and

(b) either submit the existing data you believe will satisfy the requirement, or state that you will generate the data by conducting testing. If the test procedures you will use deviate from (or are not specified in) the Pesticide Assessment Guidelines or protocols contained in the Reports of Expert Groups to the Chemicals Group, Organization for Economic Cooperation and Development (OECD) Chemicals Testing Programme, you must enclose the protocols you will use.

OR

2. Notify EPA that you have entered into an agreement with one or more other registrants to jointly develop (or share in the cost of developing) the data. If you elect this option, you must notify EPA which registrant(s) are parties to the agreement.

OR

3. File with EPA a completed "Certification of Attempt to Enter Into an Agreement With Other Registrants for Development of Data" (EPA Form 8580-6, Appendix II-4)*/

*/ FIFRA sec. 3(c)(2)(B) authorizes joint development of data by two or more registrants, and provides a mechanism by which parties can obtain an arbitrator's decision if they agree to jointly develop data but fail to agree on all the terms of the agreement. The statute does not compel any registrant to agree to develop data jointly.

(Footnote continued on next page)

OR

4. Request that EPA amend your registration by deleting the uses for which the data are needed. (This option is not available to applicants for new products.)

OR

5. Request voluntary cancellation of the registration(s) of your products for which the data are needed. (This option is not available to applicants for new products.)

D. Procedures for Requesting Changes in Testing Methodology and Extensions of Time

EPA recognizes that you may disagree with our conclusions regarding the appropriate ways to develop the required data or how quickly the data must be submitted. If the test procedures you plan to use deviate from (or are not specified in) the registration guidelines or protocols contained in the reports of the Expert Groups to the Chemical Groups, Organization for Economic Cooperation and Development (OECD) Chemicals Testing Programme, you must submit the protocol for Agency review prior to the initiation of the test.

If you think that you will need more time to generate the required data than is allowed by EPA's schedule, you may submit a request for an extension of time. The extension request must be submitted in writing to the Product Manager.

(Footnote continued from previous page)

In EPA's opinion, joint data development by all registrants subject to a data requirement or a cost-sharing agreement among all such registrants is clearly in the public interest. Duplication of testing could increase costs, tie up testing facilities, and subject an unnecessarily large number of animals to testing.

As noted earlier, EPA has discretion to suspend the registration of a product when a registrant fails to submit data required under FIFRA Section 3(c)(2)(B). EPA has concluded that it should encourage joint testing rather than duplicative testing, and that suspension should be withheld in certain cases. to further this goal. Accordingly, if (1) a registrant has informed us of his intent to develop and submit data required by this Notice; and (2) a second registrant informs EPA that it has made a bona fide offer to the first registrant to share in the expenses of the testing [on terms to be agreed upon or determined by arbitration under FIFRA Section 3(c)(2)(B)(iii)]; and (3) the first registrant has declined to agree to enter into a cost-sharing agreement, EPA will not suspend the second firm's registration.

The extension request should state the reasons why you believe that an extension is appropriate. While EPA considers your request, you must strive to meet the deadline for submitting the required data.

TABLE A
GENERIC DATA REQUIREMENTS FOR COPPER SULFATES

Guideline Citation and Name of Test	Test Substance	Guidelines Status	Are Data Required Yes	No	Footnote Number	Data Must Be Submitted Within Time Frames Listed Below[1]/
§158.120 Product Chemistry						
Product Identity:						
61-1 - Product Identity and Disclosure of Ingredients	TGAI	R	☒	☐	2	6 months
61-2 - Description of Beginning Materials and Manufacturing Process	TGAI	R	☐	☒		
61-3 - Discussion of Formation of Impurities	TGAI	R	☒	☐	3	6 months
Analysis and Certification of Product Ingredients						
62-1 - Preliminary Analysis	TGAI	CR	☒	☐	4	12 months
62-2 - Certification of Ingredient Limits	TGAI	R	☒	☐	5	12 months
62-3 - Analytical Methods and Data for Enforcement of Limits	TGAI	R	☒	☐	6	12 months
Physical and Chemical Characteristics						
63-2 - Color	TGAI	R	☐	☒		

TABLE A
GENERIC DATA REQUIREMENTS FOR COPPER SULFATES

Guideline Citation and Name of Test	Test Substance	Guidelines Status	Are Data Required Yes	Are Data Required No	Footnote Number	Data must Be Submitted Within Time Frames Listed Below[1]/
§158.120 Product Chemistry (Continued)						
63-3 - Physical State	TGAI	R	☐	☒	____	
63-4 - Odor	TGAI	R	☐	☒	____	
63-5 - Melting Point	TGAI	R	☐	☒	____	
63-6 - Boiling Point	TGAI	R	☐	☒	____	
63-7 - Density, Bulk Density, or Specific Gravity	TGAI	R	☐	☒	____	
63-8 - Solubility	TGAI	R	☐	☒	____	
63-9 - Vapor Pressure	PAI	R	☐	☒	____	
63-10 - Dissociation constant	TGAI, PAI	R	☐	☒	____	
63-11 - Octanol/water partition coefficient	PAI	R	☐	☒	____	

TABLE A
GENERIC DATA REQUIREMENTS FOR COPPER SULFATES

Guideline Citation and Name of Test	Test Substance	Guidelines Status	Are Data Required Yes	Are Data Required No	Footnote Number	Data Must Be Submitted Within Time Frames Listed Below 1/
§158.120 Product Chemistry (Continued)						
63-12 - pH	TGAI, PAI	R	☐	☒		
63-13 - Stability	TGAI	R	☐	☒		

TGAI = Technical Grade of the Active Ingredient; PAI = Pure Active Ingredient; R = Required; CR = Conditionally Required

1/ Data must be submitted within the indicated time frame, based on the date of the Guidance Document.
- 6 Month Due Date is April 1, 1986.
- 12 Month Due Date is October 1, 1986.

2/ Registrants must submit data showing precisely what form of cooper sulfate is being used in their products.

3/ Registrants must submit data on the nature and amount of impurities present in the monohydrate and anhydrous forms of copper sulfate, if it is being used.

4/ Registrants must each submit a preliminary analysis.

5/ Each registrant must submit certified limits for the pentahydrate and (if in fact used) the monohydrate and anhydrous forms. Limits may also be required for impurities if their presence is of toxicological concern.

6/ Should there be toxicological concern over certain impurities requiring certified limits, analytical methods will be needed to verify those limits.

TABLE A
GENERIC DATA REQUIREMENTS FOR COPPER SULFATES

Data Requirements	Composition[1]	Does EPA Have Data To Satisfy This Requirement? (Yes, No, or Partially)	Bibliographic Citation	Must Additional Data Be Submitted Under FIFRA Section 3(c)(2)(B)?
§158.125 Residue Chemistry				
171-4 - Nature of Residue (Metabolism)				
- Plants	PAIRA	Yes	00062069 00070287 00070288 00099255 00099256 00099257 00099258 00099259 00099260 00099262 00099263 00099269 00099281 00099282 00099284 00099288 00099537	No
- Livestock	PAIRA	Yes	00062068	No
171-4 - Residue Analytical Method				
- Plant residues	TGAI	Yes	00065678 00099551 00099522	No
- Animal Residues	TGAI	Yes	00065678 00099522 00099551	No
171-4 - Storage Stability Data	PAI	N/A[2]	-	No

TABLE A
GENERIC DATA REQUIREMENTS FOR COPPER SULFATES

Data Requirements	Composition1/	Does EPA Have Data To Satisfy This Requirement? (Yes, No, or Partially)	Bibliographic Citation	Must Additional Data Be Submitted Under FIFRA Section 3(c)(2)(B)?
§158.125 Residue Chemistry (continued)				
171-4 - Magnitude of the Residue-Residue Studies for Each Food Use	TGAI	N/A3/	-	No
- Irrigated Crops, Fish and Shellfish	TGAI	N/A4/	-	No
- Magnitude of the Residue in Meat, Poultry, and Eggs	TGAI	N/A5/	-	No

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1/ Composition: TGAI = Technical grade of the active ingredient; PAIRA = Pure active ingredient, radiolabelled; TEP = Typical end-use product; EP = End-use product.

2/ There are no data available on storage stability on plants. In light of the exemptions from the requirements of a tolerance established for copper, and since it occurs naturally in plants and animals, no storage stability studies are necessary.

3/ When applied to growing crops in accordance with good agricultural practices, copper sulfate, pentahydrate, basic, and monohydrate are exempt from the requirements of a tolerance (40 CFR 180.1001(b)(1)).

4/ A specific exemption from the requirements of a tolerance has been established for irrigated crops, fish and shellfish as a result of the use of copper sulfate as an algicide or herbicide in irrigation conveyance systems and lakes, ponds reservoirs or other bodies of water in which fish or shellfish are cultivated (40 CFR 180.1021 (a)).

5/ Copper is exempted from the requirements of a tolerance in eggs, fish, meat, milk, irrigated crops, and shellfish when it is used, as copper sulfate, as an algicide or herbicide in irrigation water systems, lakes, ponds, reservoirs, or other bodies of water (40 CFR 180.1021(a)).

TABLE A
GENERIC DATA REQUIREMENTS FOR COPPER SULFATES

Data Requirement	Composition1/	Pattern2/	Does EPA Have Data To Satisfy This Requirement? (Yes, No or Partially)	Bibliographic Citation	Must Additional Data Be Submitted Under FIFRA Section 3(c)(2)(B)?
§158.130 Environmental Fate					
DEGRADATION STUDIES-LAB:					
161-1 - Hydrolysis	TGAI	A,B,C,D,E,F,H	No	-	No3/
Photodegradation					
161-2 - In water	TGAI	A,B,C,D,E,F,H	No	-	No4/
161-3 - On soil	TGAI	A,B	No	-	No4/
161-4 - In Air	TGAI	A,B	No	-	No4/
METABOLISM STUDIES-LAB:					
162-1 - Aerobic Soil	TGAI	A,B,E,F,H	No	-	Yes - 27 months
162-2 - Anaerobic Soil	TGAI	A,B	No	-	Yes - 27 months5/
162-3 - Anaerobic Aquatic	TGAI	C,D	No	-	Yes - 27 months
162-4 - Aerobic Aquatic	TGAI	C,D	No	-	Yes - 27 months

TABLE A
GENERIC DATA REQUIREMENTS FOR COPPER SULFATES

Data Requirement	Composition1/	Pattern2/	Does EPA Have Data To Satisfy This Requirement? (Yes, No or Partially)	Bibliographic Citation	Must Additional Data Be Submitted Under FIFRA Section 3(c)(2)(B)?
§158.130 Environmental Fate (continued)					
MOBILITY STUDIES:					
163-1 - Leaching and Adsorption/Desorption	TGAI	A,B,C,D,E,F,H	No	-	Yes - 12 months6/
163-2 - Volatility (Lab)	TGAI	A,B,E,F	No	-	No7/
163-3 - Volatility (Field)	TGAI	A,B,E,F,	No	-	No7/
DISSIPATION STUDIES-FIELD:					
164-1 - Soil	TGAI	A,B,H	No	-	Yes - 27 months
164-2 - Aquatic	TGAI	C,D	No	-	Yes - 27 months
164-3 - Forestry	N/A8/	-	-	-	-
164-4 - Combination and Tank Mixes	N/A9/	-	-	-	-
164-5 - Soil, Long-term	TGAI	A,B,H	No	-	Reserved10/

TABLE A
GENERIC DATA REQUIREMENTS FOR COPPER SULFATES

Data Requirement	Composition1/	Use Pattern2/	Does EPA Have Data To Satisfy This Requirement? (Yes, No or Partially)	Bibliographic Citation	Must Additional Data Be Submitted Under FIFRA Section 3(c)(2)(B)?
§158.130 Environmental Fate (continued)					
ACCUMULATION STUDIES:					
165-1 - Rotational Crops (Confined)	TGAI	A,B,C	No	-	No11/
165-2 - Rotational Crops (Field)	TGAI	A,B,C	No	-	No11/
165-3 - Irrigated Crops	TGAI	C,D	No	-	No11/
165-4 - In Fish	TGAI	A,B,C,D	No	-	No12/
165-5 - In Aquatic Non-Target Organisms	TGAI	D	No	-	No13/
§158.140 Reentry Protection	TGAI	A,B,C,D	No	-	No14/

1/ Composition: TGAI = Technical grade of the active ingredient; PAIRA = Pure active ingredient, radiolabelled; TEP = Typical end-use product.

2/ The use patterns are coded as follows: A = Terrestrial, Food Crop; B = Terrestrial, Non-Food; C = Aquatic, Food Crop; D = Aquatic, Non-Food; E = Greenhouse, Food Crop; F = Greenhouse, Non-Food; G = Forestry; H = Domestic Outdoor; I = Indoor

TABLE A
GENERIC DATA REQUIREMENTS FOR COPPER SULFATES

§158.130 Environmental Fate (continued)

3/ A hydrolysis study is not required because these pesticides are inorganic compounds and probably will not hydrolyze.

4/ Data are not required because these pesticides are inorganic compounds and are resistant to photolysis.

5/ Data are not required from registrants who must submit data from an anaerobic aquatic metabolism study.

6/ The domestic outdoor, greenhouse, and aquatic uses require a basic equilibrium (adsorption/desorption) test.

7/ Data are not required, because the compound has a low vapor pressure and is assumed not to volatilize.

8/ Data are not required because there are no forestry uses.

9/ Data are not required under this Standard, which deals only with products containing copper sulfates as the single active ingredient.

10/ This data requirement may be waived, depending on results of the aerobic soil, field dissipation (soil), and field dissipation (Aquatic sediment) studies required under 162-1, 164-1, and 164-2(b)(1).

11/ Data not required because all food tolerances for copper sulfates have been exempted.

12/ Data are not required because copper sulfates are freely soluble in water and they presumably have octanol/water partition coefficients less than 1000.

13/ Data are not required because copper sulfates are water soluble and therefore have a low potential for bioaccumulation.

14/ Data are not required because the copper sulfates do not fall within Toxicity Category I for inhalation toxicity, and because the non-volatile properties and methods of use should minimize exposure of workers re-entering treated fields.

TABLE A
GENERIC DATA REQUIREMENTS FOR COPPER SULFATES

Data Requirement	Composition[1]/	Use Patterns[2]/	Does EPA Have Data To Satisfy This Requirement? (Yes, No or Partially)	Bibliographic Citation	Must Additional Data Be Submitted Under FIFRA Section 3(c)(2)(B)?
§158.135 Toxicology					
ACUTE TESTING:					
81-1 - Acute Oral Toxicity -	TGAI	A,B,C,D, E,F,H,I	No	-	No[3]/
81-2 - Acute Dermal Toxicity	TGAI	A,B,C,D, E,F,H,I	No	-	No[3]/
81-3 - Acute Inhalation Toxicity	TGAI	A,B,C,D, E,F,H,I	No	-	No[3]/
81-4 - Primary Eye Irritation	TGAI	A,B,C,D, E,F,H,I	No	-	No[3]/
81-5 - Primary Dermal Irritation	TGAI	A,B,C,D, E,F,H,I	No	-	No[3]/

TABLE A
GENERIC DATA REQUIREMENTS FOR COPPER SULFATES

Data Requirement	Composition1/	Use Patterns2/	Does EPA Have Data To Satisfy This Requirement? (Yes, No or Partially)	Bibliographic Citation	Must Additional Data Be Submitted Under FIFRA Section 3(c)(2)(B)?
§158.135 Toxicology					
81-6 - Dermal Sensitization	TGAI	A,B,C,D, E,F,H,I	No	-	No3/
81-7 - Acute Delayed Neurotoxicity - Hen	TGAI	A,B,C,D, E,F,H,I	N/A	-	N/A
SUBCHRONIC TESTING:					
82-1 - 90-Day Feeding - Rodent	TGAI	A,B,C,D, E,F,H,I	No	-	No3/
Non-rodent (dog)					
Non-rodent (guinea pig)					
82-2 - 21-Day Dermal	TGAI	A,B,C,D, E,F,H,I	No	-	No3/
82-3 - 90-Day Dermal	TGAI	A,B,C,D, E,F,H,I	No	-	No3/
82-4 - 90-Day Inhalation	TGAI	A,B,C,D, E,F,H,I	No	-	No3/
82-5 - 90-Day Neurotoxicity-Hen	TGAI	A,B,C,D, E,F,H,I	N/A	-	N/A

TABLE A
GENERIC DATA REQUIREMENTS FOR COPPER SULFATES

Data Requirement	Composition1/	Use Patterns2/	Does EPA Have Data To Satisfy This Requirement? (Yes, No or Partially)	Bibliographic Citation	Must Additional Data Be Submitted Under FIFRA Section 3(c)(2)(B)?
§158.135 Toxicology (continued)					
CHRONIC TESTING:					
83-1 - Chronic Toxicity -	TGAI	A,B,C,D, E,F,H,I	No	-	No3/
Rodent (rat)					
Non-rodent (dog)					
83-2 - Oncogenicity -	TGAI	A,B,C,D, E,F,H,I	No	-	No3/
Rat					
Mouse					
83-3 - Teratogenicity -	TGAI	A,B,C,D, E,F,H,I	No	-	No3/
Rat					
Hamster					
83-4 - Reproduction - 2-generation	TGAI	A,B,C,D, E,F,H,I	No	-	No3/

TABLE A
GENERIC DATA REQUIREMENTS FOR COPPER SULFATES

Data Requirement	Composition1?	Use Patterns2/	Does EPA Have Data To Satisfy This Requirement? (Yes, No or Partially)	Bibliographic Citation	Must Additional Data Be Submitted Under FIFRA Section 3(c)(2)(B)?
MUTAGENICITY TESTING					
84-2 - Gene Mutation	TGAI	A,B,C,D, E,F,H,I	No	-	No3/
84-2 - Chromosomal Aberration	TGAI	A,B,C,D, E,F,H,I	No	-	No3/
84-2 - Other Genotoxic Effects	TGAI	A,B,C,D, E,F,H,I	No	-	No3/
SPECIAL TESTING:					
85-1 - General Metabolism	TGAI	A,B,C,D, E,F,H,I	No	-	No3/

1/ Composition: Material to be tested is technical grade unless otherwise specified in footnotes. PAI= Pure Active Ingredient. PAIRA= Pure Active Ingredient, Radio-Labeled.

2/ The use patterns are coded as follows: A = Terrestrial, Food Crop; B = Terrestrial, Non-Food; C = Aquatic, Food Crop; D = Aquatic, Non-Food; E = Greenhouse, Food Crop; F = Greenhouse, Non-Food; G = Forestry; H = Domestic Outdoor; I = Indoor; IP = Industrial Preservative.

3/ Although the Agency does not have "guideline" quality studies for this data requirement per se, there is adequate information in the extensive open literature on copper sulfate to characterize its toxicity.

TABLE A
GENERIC DATA REQUIREMENTS FOR COPPER SULFATES

Data Requirement	Composition1/	Use Pattern2/	Does EPA Have Data To Satisfy This Requirement? (Yes, No or Partially)	Bibliographic Citation	Must Additional Data Be Submitted Under FIFRA Section 3(c)(2)(B)?
§158.145 Wildlife and Aquatic Organisms					
AVIAN AND MAMMALIAN TESTING					
71-1 - Avian Acute Oral Toxicity	TGAI	A,B,C,D,H,I3/	Yes	00067455 00067456	No
71-2 - Avian Dietary Toxicity					
a) Waterfowl	TGAI	A,B,C,D,H,	Yes	00067454	No
b) Upland Gamebird	TGAI	A,B,C,D,H,I3/	Yes	00106119	No
71-3 - Wild Mammal Toxicity	TGAI	A,B,C,D	No	-	No
71-4 - Avian Reproduction	TGAI	A,B,C,D	No	-	No4/
71-5 - Simulated and Actual Field Testing - Mammals and Birds	TEP	A,B,C,D	No	-	No4/
AQUATIC ORGANISM TESTING					
72-1 - Freshwater Fish Acute Toxicity					
a) Warmwater Fish	TGAI	A,B,C,D,H	Yes	00047460 00099374	No
	TEP	C,D5/	No	-	Yes - 9 months
b) Coldwater Fish	TGAI	A,B,C,D,H,I3/	Yes	00047460 00056781 00099168	No
	TEP	C,D5/	No	-	Yes - 9 months

TABLE A
GENERIC DATA REQUIREMENTS FOR COPPER SULFATES

Data Requirement	Composition1/	Use Pattern2/	Does EPA Have Data To Satisfy This Requirement? (Yes, No or Partially)	Bibliographic Citation	Must Additional Data Be Submitted Under FIFRA Section 3(c)(2)(B)?
§158.145 Wildlife and Aquatic Organisms (continued)					
72-2 - Acute Toxicity to Freshwater Invertebrates	TGAI	A,B,C,D,H,I3/	Yes	00099558	No
	TEP	C,D5/	No	-	Yes - 9 months
72-3 - Acute Toxicity to Estuarine and Marine Organisms					
a) Shrimp	TGAI	A,C,D	Partially	00099559 00085289	No
	TEP	C,D5/	No	-	Yes - 12 months
b) Marine Fish	TGAI	A,C,D	No	-	Yes - 12 months
	TEP	C,D5/	No	-	Yes - 12 months
c) Oyster	TGAI	A,C,D	Partially	00099561	No
	TEP	C,D5/	No	-	Yes - 12 months
72-4 - Fish Early Life Stage and Aquatic Invertebrate Life-Cycle					
a) Fish	TGAI	C,D	No	-	Yes - 15 months6/
b) Aquatic Invertebrate	TGAI	C,D	No	-	Yes - 15 months
72-5 - Fish - Life-Cycle	TGAI	C,D	No	-	Reserved7/

TABLE A
GENERIC DATA REQUIREMENTS FOR COPPER SULFATES

Data Requirement	Composition[1/]	Use Pattern[2/]	Does EPA Have Data To Satisfy This Requirement? (Yes, No or Partially)	Bibliographic Citation	Must Additional Data Be Submitted Under FIFRA Section 3(c)(2)(B)
§158.145 Wildlife And Aquatic Organisms (continued)					
72-6 - Aquatic Organism Accumulation	TGAI, PAI or Degradation Product	C,D	Yes	00099168✓	No[8/]
72-7 - Simulated or Actual Field Testing - Aquatic Organisms	TEP	A,C,D	No	-	Yes - 2-4 years[9/]

1/ Composition: TGAI = Technical grade of the active ingredient; PAI = Pure active ingredient; TEP = Typical end-use product.

2/ The use patterns are coded as follows: A = Terrestrial, Food Crop; B = Terrestrial, Non-Food; C = Aquatic, Food Crop; D = Aquatic, Non-Food; E = Greenhouse, Food Crop; F = Greenhouse, Non-Food; G = Forestry; H = Domestic Outdoor; I = Indoor

3/ Study required for MPs that are to be used to create products with only indoor uses.

4/ Data from acute toxicology tests indicate that reproductive and/or field tests will not be necessary.

5/ In addition to testing of technical, formulation testing is required when pesticide is applied directly to water.

TABLE A
GENERIC DATA REQUIREMENTS FOR COPPER SULFATES

§158.145 Wildlife and Aquatic Organisms (Continued)

6/ Fish embryolarvae testing on coldwater (trout) and warmwater (bluegill) species to support rice use, aquatic herbicide and molluscicide use.

7/ Reserved pending results of fish early life stage study.

8/ Data are not required because copper sulfates are freely soluble in water and therefore have a low potential for bioaccumulation.

9/ To conduct a risk assessment and develop a Fish Caution for snail and leech control. Present fish caution is based on algicide and herbicide use (2 ppm copper sulfate). Precaution recommends treating only 1/3 to 1/2 of the pond or lake in heavy algae situations and retreating the remaining area 7-21 days later in order to reduce fish kills. However, copper sulfate use as molluscicide is at much higher levels (10 ppm). This application accounts for about 20 times the toxicity level for trout and up to 30 times for other fish species. Since diffusion rates, decomposition absorption, and precipitation of copper sulfate in a large body of water is unknown, field testing to determine the appropriate treatment zone will be required to protect nontarget aquatic organisms.

Note: After completion of the data-gathering phase of the Registration Standard process, the Agency discovered additional data concerning the effects of copper sulfate on non-target organisms. These data were discovered too late to be reviewed for this Registration Standard. Registrants and applicants may wish to contact the Agency to determine whether any of these additional data will fulfill data requirements under §158.145.

TABLE A
GENERIC DATA REQUIREMENTS FOR COPPER SULFATES

Data Requirement	Composition1/	Use Pattern2/	Does EPA Have Data To Satisfy This Requirement? (Yes, No, or Partially)	Bibliographic Citation	Must Additional Data Be Submitted Under FIFRA Section 3(c)(2)(B)?
§158.155 Nontarget Insect					
NONTARGET INSECT TESTING -					
Pollinators:					
141-1 - Honey bee acute contact toxicity	TGAI	A,B,H	Yes	00001999 ✓	No
141-2 - Honey bee - toxicity of residues on foliage	TEP	A,B,H	No	-	No3/
141-4 - Honey bee subacute feeding study	[Reserved]4/				
141-5 - Field testing for pollinators	TEP	A,B,H	No	-	No3/

TABLE A
GENERIC DATA REQUIREMENTS FOR COPPER SULFATES

Data Requirement	Composition1/	Use Pattern2/	Does EPA Have Data To Satisfy This Requirement? (Yes, No or Partially)	Bibliographic Citation	Must Additional Data Be Submitted Under FIFRA Section 3(c)(2)(B)?
§158.155 Nontarget Insect (continued)					
NONTARGET INSECT TESTING - AQUATIC INSECTS:					
142-1 - Acute toxicity to aquatic insects	[Reserved]5/				
142-2 - Aquatic insect life-cycle study	[Reserved]5/				
142-3 - Simulated or actual field testing for aquatic insects	[Reserved]5/				
143-1- thru 143-3 NONTARGET INSECT TESTING PREDATORS AND PARASITES	[Reserved]5/				

1/ Composition: TGAI = Technical grade of the active ingredient; TEP = Typical end-use product.

2/ The use pattern codes are as follows: A = Terrestrial, Food Crop; B = Terrestrial, Non-Food; C = Aquatic, Food Crop; D = Aquatic, Non-Food; E = Greenhouse, Food Crop; F = Greenhouse, Non-Food; G = Forestry; H = Domestic Outdoor; I = Indoor.

3/ Data are not required because the acute study data indicate low toxicity to bees.

4/ Reserved, pending Agency development of test methodology.

5/ Reserved, pending Agency decision as to whether the data requirement should be established.

III. REQUIREMENT FOR SUBMISSION OF PRODUCT-SPECIFIC DATA

Note: Unless stated otherwise in Section I, Regulatory Position and Rationale, this Section applies only to manufacturing use products, not to end use products.

A necessary first step in determining which statements must appear on your product's label is the completion and submission to EPA of product-specific data* listed on the form entitled "Product Specific Data Report" (EPA Form 8580-4, Appendix III-1) to fill gaps identified by EPA concerning your product. Under the authority of FIFRA sec. 3(c)(2)(B), EPA has determined that you must submit these data to EPA in order to reregister your product(s).

Table A--Generic Data Requirements for Manufacturing-Use Products--lists the data you must submit. Data that are required to be submitted are identified in the column of those tables entitled "Must Data Be Submitted Under §3(c)(2)(B)."

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*/ Product specific data pertain to data that support the formulation which is marketed; it usually includes product chemistry data and acute toxicity data.

IV. SUBMISSION OF REVISED LABELING

Note: This section applies to end-use products only to the extent described in Section I (Regulatory Position and Rationale). Otherwise, the following information pertains exclusively to manufacturing-use products.

FIFRA requires each product to be labeled with accurate, complete and sufficient instructions and precautions, reflecting the results of data concerning the product and its ingredients. Labeling requirements are set out in 40 CFR 162.10 (see Appendix IV-1) and are summarized for products containing this active ingredient as part of this Guidance Document (See Appendix IV-2). Applications submitted in response to this notice must include draft labeling for Agency review.

If you fail to submit revised labeling information complying with this section (supplemented by requirements described in Section I, Regulatory Position and Rationale), EPA may issue a notice of intent to cancel the registration under FIFRA sec. 6(b)(1).

A. Label Contents

40 CFR 162.10 requires that certain specific labeling statements appear at certain locations on the label. This is referred to as format labeling. Specific label items listed below are keyed to Appendix IV-2.

Item 1. PRODUCT NAME - The name, brand or trademark is required to be located on the front panel, preferably centered in the upper part of the panel. The name of a product will not be accepted if it is false or misleading.

Item 2. COMPANY NAME AND ADDRESS - The name and address of the registrant or distributor is required on the label. The name and address should preferably be located at the bottom of the front panel or at the end of the label text.

Item 3. NET CONTENTS - A net contents statement is required on all labels or on the container of the pesticide. The preferred location is the bottom of the front panel immediately above the company name and address, or at the end of the label text. The net contents must be expressed in the largest suitable unit, e.g., "1 pound 10 ounces" rather than "26 ounces." In addition to English units, net contents may be expressed in metric units. See Appendix IV-1. [40 CFR 162.10(d)]

Item 4. EPA REGISTRATION NUMBER - The registration number assigned to the pesticide product must appear on the label, preceded by the phrase "EPA Registration No.," or "EPA Reg. No." The registration number must be set in type of a size and style similar to other print on that part of the label on which it appears and must run parallel to it. The registration number and the required identifying phrase must not appear in such a manner as to suggest or imply recommendation or endorsement of the product by the Agency. See Appendix IV-1. [40 CFR 162.10(e)]

Item 5. EPA ESTABLISHMENT NUMBER - The EPA establishment number, preceded by the phrase "EPA Est." is the final establishment at which the product was produced, and may appear in any suitable location on the label or immediate container. It must also appear on the wrapper or outside container of the package if the EPA establishment number on the immediate container cannot be clearly read through such wrapper or container. See Appendix IV-1. [40 CFR 162.10(f)]

Item 6A. INGREDIENTS STATEMENT - An ingredients statement is required on the front panel. The ingredients statement must contain the name and percentage by weight of each active ingredient and the total percentage by weight of all inert ingredients. The preferred location is immediately below the product name. The ingredients statement must run parallel with, and be clearly distinguished from, other text on the panel. It must not be placed in the body of other text. See Appendix IV-1. [40 CFR 162.10(g)]

Item 6B. POUNDS PER GALLON STATEMENT - For liquid agricultural formulations, the pounds per gallon of active ingredient must be indicated on the label.

Item 7. FRONT LABEL PRECAUTIONARY STATEMENTS - Front panel precautionary statements must be grouped together, preferably within a block outline. The table below shows the minimum type size requirements for various size labels.

Size of Label on Front Panel in Square Inches	Signal Word Minimum Type Size All Capitals	"Keep Out of Reach of Children" Minimum Type Size
5 and under	6 point	6 point
above 5 to 10	10 point	6 point
above 10 to 15	12 point	8 point
above 15 to 30	14 point	10 point
over 30	18 point	12 point

Item 7A. CHILD HAZARD WARNING STATEMENT - The statement "Keep Out of Reach of Children" must be located on the front panel above the signal word except where contact with children during distribution or use is unlikely. See Appendix IV-1. [40 CFR 162.10(h)(1)(ii)]

Item 7B. SIGNAL WORD - The signal word (DANGER, WARNING, or CAUTION) is required on the front panel immediately below the child hazard warning statement. See Appendix IV-1. [40 CFR 162.10 (h)(1)(i)]

Item 7C. SKULL & CROSSBONES AND WORD "POISON" - On products assigned a toxicity Category I on the basis of oral, dermal, or inhalation toxicity, the word "Poison" shall appear on the label in red on a background of distinctly contrasting color and the skull and crossbones shall appear in immediate proximity to the word POISON. See Appendix IV-1. [40 CFR 162.10(h)(1)(i)]

Item 7D. STATEMENT OF PRACTICAL TREATMENT - A statement of practical treatment (first aid or other) shall appear on the label of pesticide products in toxicity Categories I, II, and III. See Appendix IV-1. [40 CFR 162.10(h)(1)(iii)]

Item 7E. REFERRAL STATEMENT - The statement "See Side (or Back) Panel for Additional Precautionary Statements" is required on the front panel for all products, unless all required precautionary statements appear on the front panel. See Appendix IV-1. [40 CFR 162.10(h)(1)(iii)]

Item 8. SIDE/BACK PANEL PRECAUTIONARY LABELING - The precautionary statements listed below must appear together on the label under the heading "PRECAUTIONARY STATEMENTS." The preferred location is at the top of the side or back panel preceding the directions for use, and it is preferred that these statements be surrounded by a block outline. Each of the three hazard warning statements must be headed by the appropriate hazard title. See Appendix IV-1. [40 CFR 162.10 (h)(2)].

Item 8A. HAZARD TO HUMANS AND DOMESTIC ANIMALS - Where a hazard exists to humans or domestic animals, precautionary statements are required indicating the particular hazard, the route(s) of exposure and the precautions to be taken to avoid accident, injury or damage. See Appendix IV-1. [40 CFR 162.10 (h)(2)(i)]

Item 8B. ENVIRONMENTAL HAZARD - Where a hazard exists to non-target organisms excluding humans and domestic animals, precautionary statements are required stating the nature of the hazard and the appropriate precautions to avoid potential accident, injury, or damage. See Appendix IV-1. [40 CFR 162.10(h)(2)(ii)]

Item 8C. PHYSICAL OR CHEMICAL HAZARD

1. Flammability statement. Precautionary statements relating to flammability of a product are required to appear on the label if it meets the criteria in Appendix IV-3. The requirement is based on the results of the flashpoint determinations and flame extension tests required to be submitted for all products. These statements are to be located in the side/back panel precautionary statements section, preceded by the heading "Physical/Chemical Hazards." Note that no signal word is used in conjunction with the flammability statements.

2. Criteria for declaration of non-flammability. The following criteria will be used to determine if a product is non-flammable:

a. A "non-flammable gas" is a gas (or mixture of gases) that will not ignite when a lighted match is placed against the open cylinder valve.

b. A "non-flammable liquid" is one having a flashpoint greater than 350°F (177°C).

c. A "non-flammable aerosol" is one which meets the following criteria:

i. The flame extension is zero inches;

ii. There is no flashback; and

iii. The flashpoint of the non-volatile liquid component is greater than 350°F (177°C).

3. Declaration of non-flammability. Products which meet the criteria for non-flammability specified above may bear the notation "non-flammable" or "non-flammable (gas, liquid, etc.)" on the label. It may appear as a substatement to the ingredients statement, or on a back or side panel, but shall not be highlighted or emphasized (as with an inordinately large type size) in any way that may detract from precaution.

4. Other physical/chemical hazard statements. When chemistry data demonstrate hazards of a physical or chemical nature other than flammability, appropriate statements of hazard will be prescribed. Such statements may address hazards of explosivity, oxidizing or reducing capability, or mixing with other substances to produce toxic fumes.

Item 9A. RESTRICTED USE CLASSIFICATION - FIFRA sec. 3(d) requires that all pesticide formulations/uses be either unclassified or classified for restricted use. Products classified for restricted use may be limited to use by certified applicators or persons under their direct supervision (or may be subject to other restrictions that may be imposed by regulation).

In the Registration Standard, the Agency has (1) indicated certain formulations/uses are to be restricted (Section I indicates why the product has been classified for restricted use); or (2) reserved any classification decision until appropriate data are submitted.

The Regulatory Position and Rationale states whether products containing this active ingredient are classified for restricted use. If they are restricted the draft label(s) submitted to the Agency as part of your application must reflect this determination (see below).

If you do not believe that your product should be classified for restricted use, you must submit any information and rationale with your application for reregistration. During the Agency's review of your application, your proposed classification determination will be evaluated in accordance with the provisions of 40 CFR 162.11(c). You will be notified of the Agency's classification decision.

A. Classification Labeling Requirements

If Section I of this Guidance Document indicates that your product has been classified for restricted use, the following label requirements apply:

1. Front panel statement of restricted use classification.

a. The statement "Restricted Use Pesticide" must appear at the top of the front panel of the label. The statement must be set in type of the same minimum size as required for human hazard signal word (see table in 40 CFR 162.10(h)(1)(iv).

b. Directly below this statement on the front panel, a summary statement of the terms of restriction must appear (including the reasons for restriction if specified in Section I). If use is restricted to certified applicators, the following statement is required: "For retail sale to and use only by Certified Applicators or persons under their direct supervision and only for those uses covered by the Certified Applicator's Certification."

2. Some but not all uses restricted. If the Regulatory Position and Rationale states that some uses are classified for restricted use, and some are unclassified, several courses of action are available:

a. You may label the product for Restricted use. If you do so, you may include on the label uses that are unrestricted, but you may not distinguish them on the label as being unrestricted.

b. You may delete all restricted uses from your label and submit draft labeling bearing only unrestricted uses.

c. You may "split" your registration, i.e., register two separate products with identical formulations, one bearing only unrestricted uses, and the other bearing restricted uses. To do so, submit two applications for reregistration, each containing all forms and necessary labels. Both applications should be submitted simultaneously. Note that the products will be assigned separate registration numbers.

B. Compliance Schedules

No product with a use classified for restricted use under this Standard may be released for shipment by the registrant or producer after one year from the date of issuance of this Standard, unless such product bears the restricted use classification. All products still in channels of trade after two years from the date of issuance of this Standard must be labeled for restricted use.

Item 9B [There is no Item 9B].

Item 9C. MISUSE STATEMENT - All products must bear the misuse statement, "It is a violation of Federal law to use this product in a manner inconsistent with its labeling." This statement appears at the beginning of the directions for use, directly beneath the heading of that section.

Item 10A. REENTRY STATEMENT - If a reentry interval has been established by the Agency, it must be included on the label. Additional worker protection statements may be required in accordance with PR Notice 83-2, March 29, 1983.

Item 10B [There is no Item 10B].

Item 10C. STORAGE AND DISPOSAL BLOCK - All labels are required to bear storage and disposal statements. These statements are developed for specific containers, sizes, and chemical content. These instructions must be grouped and appear under the heading "Storage and Disposal" in the directions for use. This heading must be set in the same type sizes as required for the child hazard warning. Refer to Appendix IV-4 to determine the disposal instructions appropriate for your products.

Item 10D. DIRECTIONS FOR USE - Directions for use must be stated in terms which can be easily read and understood by the average person likely to use or to supervise the use of the pesticide. When followed, directions must be adequate to protect the public from fraud and from personal injury and to prevent unreasonable adverse effects on the environment. See Appendix IV-1. [40 CFR 162.10]

B. Collateral Labeling

Bulletins, leaflets, circulars, brochures, data sheets, flyers, or other written or graphic printed matter which is referred to on the label or which is to accompany the product are termed collateral labeling. Such labeling may not bear claims or representations that differ in substance from those accepted in connection with registration of the product. It should be made part of the response to this notice and submitted for review.

V. INSTRUCTIONS FOR SUBMISSION

A. For Manufacturing Products (MP) containing Copper Sulfate as an active ingredient.

1. Within 90 days from receipt of this document, you must submit to the Product Manager in the Registration Division at the address given at the end of this section the "FIFRA Section 3(c)(2)(B) Summary Sheet" EPA Form 8580-1. Refer to Appendix II-3 with appropriate attachments.

If on the Summary Sheet, you commit to develop the data, request a minor chemical exemption, present arguments that a data requirement is not applicable, or submit protocols or modified protocols for Agency review, you must also submit a copy of the Summary Sheet (and any supporting information) to the Office of Compliance Monitoring, which will be monitoring the data generated in response to this notice. This information should be submitted to the Office of Compliance Monitoring at the address given at the end of this section. (Actual studies are not to be submitted.)

2. Within 6 months from receipt of this document you must submit to the Product Manager on the Registration Division:

a. Confidential Statement of Formula, EPA Form 8570-4.

b. Product Specific Data Report, EPA Form 8580-4 (Appendix III-1).

c. Two copies of any required product-specific data.

d. Two copies of draft labeling, including the label and associated brochures. If current labeling conforms to the requirements of this guidance document and the results of the short-term data, you may submit such labeling. End use product labeling must comply specifically with the instructions in Section I (Regulatory Position and Rationale) of this guidance document. The labeling should be either typewritten text on 8-1/2 x 11 inch paper or a mockup of the labeling suitable for storage in 8-1/2 x 11 inch files. The draft label must indicate the intended colors of the final label, clear indication of the front panel label, and the intended type sizes of the text.

e. Evidence of compliance with data support requirements of FIFRA sec. 3(c)(1)(D). Refer to 40 CFR 152.80-152.99 (enclosed) for latest requirements.

3. Within the times set forth in Table A, you must submit to the Registration Division all generic data, unless you are eligible for the formulator's exemption. If for any reason any test is delayed or aborted so that the agreed schedule cannot be met, notify the Product Manager and the Office of Compliance Monitoring.

B. For Manufacturing Use Products containing Copper Sulfate in combination with other active ingredients

1. Within 90 days from receipt of this document, you must submit the "FIFRA Section 3(c)(2)(B) Summary Sheet," EPA Form 8580-1. Refer to Appendix II-3 with appropriate attachments.

If on the Summary Sheet, you commit to develop the data, request a minor chemical exemption, present arguments that a data requirement is not applicable, or submit protocols or modified protocols for Agency review, you must also submit a copy of the Summary Sheet (and any supporting information) to the Office of Compliance Monitoring, which will be monitoring the data generated in response to this notice. This information should be submitted to the Office of Compliance Monitoring at the address given at the end of this section. (Actual studies are not to be submitted.)

2. Within the times set forth in Table A, you must submit to the Registration Division all generic data, unless you are eligible for the formulator's exemption. If for any reason any test is delayed or aborted so that the agreed schedule cannot be met, notify the Product Manager and the Office of Compliance Monitoring.

C. For End Use Products containing Copper Sulfate alone or in combination with other active ingredients:

1. Within 90 days from receipt of this document, you must submit the "FIFRA Section 3(c)(2)(B) Summary Sheet," EPA Form 8580-1. Refer to Appendix II-3 with appropriate attachments.

If on the Summary Sheet, you commit to develop the data, request a minor chemical exemption, present arguments that a data requirement is not applicable, or submit protocols or modified protocols for Agency review, you must also submit a copy of the Summary Sheet (and any supporting information) to the Office of Compliance Monitoring, which will be monitoring the data generated in response to this notice. This information should be submitted to the Office of Compliance Monitoring at the address given at the end of this section. (Actual studies are not to be submitted.)

2. Within 6 months from receipt of this document you must submit:

a. Confidential Statement of Formula, EPA Form 8570-4.

b. Product-Specific Data Report, EPA Form 8580-4 (Appendix III-1).

c. Two copies of any required product-specific data. (Refer to Table C).

d. Two copies of draft labeling, including the label and associated brochures. If current labeling conforms to the requirements of this guidance document and the results of the short-term data, you may submit such labeling. End use product labeling must comply specifically with the instructions in Section I (Regulatory Position and Rationale) of this guidance document. Labeling should be either typewritten text on 8 1/2 x 11 inch paper or a mockup of the labeling suitable for storage in 8 1/2 inch files. The draft label must indicate the intended colors of the final label, clear indication of the front panel label, and the intended type sizes of the text.

e. Evidence of compliance with data support requirements of FIFRA sec. 3(c)(1)(D). Refer to 40 CFR 152.80-152.99 (enclosed) for latest requirements.

3. Within the time frames set forth in Table A, submit all generic data, unless you are eligible for the formulator's exemption.

D. For intrastate products containing Copper Sulfate either as the sole active ingredient or in combination with other active ingredients

These products are being called in for full Federal registration. Producers of these products are being sent a letter instructing them how to submit an application for registration.

E. Applications and other required information should be submitted to the following address:

Richard Mountfort
Product Manager
Registration Division (TS-767C)
Office of Pesticide Programs
Environmental Protection Agency
401 M St., S.W.
Washington, D.C. 20460
Phone No. (703) 557-1650

The address for submission to the Office of Compliance Monitoring is:

Laboratory Data Integrity Program
Office of Compliance Monitoring (EN-342)
Environmental Protection Agency
401 M St., S.W.
Washington, D.C. 20460

Pages 50 through 195 consist of three entries to the EPA Index to Pesticide Chemicals: Basic copper sulfate, copper sulfate monohydrate, and copper sulfate pentahydrate.

FINAL
SHI/SAI
h008101

BASIC COPPER SULFATE*

TYPE PESTICIDE: Herbicide

FORMULATIONS:
Tech (53%)
WP (12.5%, 12.75%, 46.25%, 52%)

GENERAL WARNINGS AND LIMITATIONS: A selective herbicide for the control of ball moss, lichens and spanish moss. The active ingredient is expressed as percentage of metallic copper.

TIME REQUIRED FOR CONTROL: Not located.

PHYTOTOXICITY TO TARGET WEEDS: Not located.

PHYTOTOXICITY TO CROPS: Not located.

MODE OF ACTION: Not located.

GRASSES AND OTHER MONOCOTS CONTROLLED:

FOABBB	ball moss
FOABBA	spanish moss

NONFLOWERING PLANTS CONTROLLED:

LAAAAA	lichens

*tribasic copper sulfate

BASIC COPPER SULFATE

	Site, Dosage and Formulation	Tolerance, Use, Limitations
	AGRICULTURAL CROPS	
/03008AA	Pecan	Exempt.
/35353AA	Pecan (ornamental)	
	12 tbsp product/ gal water (12.5% WP) (12.75% WP)	Directed spray. Spanish moss control. Apply during winter.
	ORNAMENTALS	
/35191AA	Live Oak	
	3.12 lb a.i./ 100 gal water (52% WP)	Use limited to TX. Directed spray. Ball moss control. Apply in the spring after a heavy rain, using 1.5 gallons of spray per foot of tree height. Applications may be needed once a year.
/34004AA	Ornamental Woody Shrubs	
/35000AA	Ornamental and/or Shade Trees	
	3 tbsp product/ gal water (46.25% WP)	Directed spray. Lichen control. Thoroughly wet lichens, and repeat as needed.
	Pecan (ornamental)	See AGRICULTURAL CROPS, Pecan cluster.

BASIC COPPER SULFATE

Listing of Registered Pesticide Products by Formulation

53% technical chemical
  basic copper sulfate (008101)
    035896-00004

12.5% wettable powder
  basic copper sulfate (008101)
    005481-00135

12.75% wettable powder
  basic copper sulfate (008101)
    002217-00613   033955-00097   048391-00013

46.25% wettable powder
  basic copper sulfate (008101)
    000557-01933

52% wettable powder
  basic copper sulfate (008101)
    001278-00001

Appendix B

Listing of Registration Numbers By Site

AGRICULTURAL CROPS

/03008AA	Pecan	002217-00613 005481-00135 033955-00097 048391-00013

ORNAMENTALS

/35191AA	Live Oak	001278-00001
/34004AA	Ornamental Woody Shrubs	000557-01933
/35000AA	Ornamental and/or Shade Trees	000557-01933
/35353AA	Pecan (ornamental)	002217-00613 005481-00135 033955-00097 048391-00013

FINAL
SAI/MAI
c008101

EPA Index to Pesticide Chemicals

BASIC COPPER SULFATE*

TYPE PESTICIDE: Fungicide

FORMULATIONS:
Tech (53%)
D (2%, 3%, 3.4%, 3.5%, 3.8%, 4%, 4.5%, 5%, 6%, 6.25%, 6.3%, 6.7%, 7%, 8%)
WP (4%, 5.2%, 6.3%, 7.1%, 7.3%, 7.4%, 12.5%, 12.75%, 13.85%, 14.3%, 14.9%, 15.2%, 15.6%, 17.05%, 18.1%, 19%, 20.1%, 22%, 30.25%, 30.6%, 33%, 46.25%, 50%, 52%, 53%)
WP/D (3.7%, 5%, 7%)
FlC (0.11 lb/gal, 0.39 lb/gal or 4.15%, 0.48 lb/gal or 4.4%, 0.53 lb/gal, 1 lb/gal, 3 lb/gal, 4.24 lb/gal)

GENERAL WARNINGS AND LIMITATIONS: Do not use with or immediately before or after lime sulfur or ferbam. Dosage rates are given in pounds of metallic copper. May be applied by dilute ground equipment, concentrate equipment, aircraft, or sprinkler irrigation systems. For concentrate sprayers, consult manufacturer's recommendations for spray volumes. Dusts may be applied by aircraft. Dosages may be adjusted proportionately for smaller areas [note, however, that the relationship of tablespoons per gallon to pounds per 100 gallons varies among labeling]. Wettable powder formulations (53 percent) may be applied as a dust when prepared with a suitable diluent. Though recommendations for the addition of hydrated lime and/or spreader-sticker are given within, a State Agricultural Cooperative Extension Service should be consulted for specific information. NOTE - Agricultural seed treatment uses are placed as a group after the agricultural crop uses.

Definition of Terms:
MAI - Multiple active ingredient(s)
a.i. - active ingredient
Tablespoons (tbls) actual: A hypothetical quantity computed by multiplying the number (or equivalent number) of tablespoons or product by the concentrations of metallic copper (from basic copper sulfate) in the formulation.

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*tribasic copper sulfate

AGRICULTURAL CROPS

General Warnings and Limitations: The restrictions on the timing of application in certain sites may be attributed to phytotoxicity. Overspraying may cause injury to tender foliage of almonds, apricot, peaches, and some Japanese plums.

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
/23001AA	Alfalfa		Exempt No preharvest interval through 1.04 pounds per 100 gallons.
FMBCCBM	Leaf spot (Cercospora)	1.04 lb/ 100 gal (52% WP)	Foliar application. Apply 10 to 14 days before each harvest. Consult a State Extension Service for sensitive local species that might be injured.
FMBCLAT	Leptosphaerulina leaf spot		
/03001AA	Almond		Exempt Apply through 21.2 pounds per acre. Do not apply when trees are in full leaf.
FBADMCB	Brown rot blossom and twig blight (Monilinia)	1.59-2.65 lb/ 100 gal [350-400 gal/A] [max. 21.2 lb/A] (19-53% WP) (7% WP/D) (4.24 lb/gal FlC) or 1.0-1.5 lb/ 100 gal [350-400 gal/A] (3 lb/gal FlC) or 2.85-3.23 lb/A (3.8% D) (7% WP/D) or	Dormant, delayed dormant, and foliar application. Add a suitable spreader-sticker. Apply in dormant (for shothole), and at pink bud through popcorn stage. OR MAI Formulated with sulfur; or zinc sulfate, basic.
FBAZCEL	Shothole (Coryneum blight)		

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
	Almonds (continued)		
		concentrate: 4.24-7.42 lb/A [25-50 gal/A] (53% WP) (4.24 lb/gal FlC) or 2.5-3.0 lb/A (3 lb/gal FlC) or aerial, dormant: 8.48-10.6 lb/ 20 gal/A (53% WP) (4.24 lb/gal FlC) or 4.0-7.42 lb/ 20 gal/A (3-4.24 lb/ gal FlC) OR MAI 1.14-1.52 lb/ 100 gal (19% WP) or 0.24-0.48 lb/ 100 gal (0.48 lb/gal or 4.4% FlC)	
/04001AA	**Apple**		Exempt No preharvest interval through 16.96 pounds per acre.
FAAANAK	Anthracnose (Neofabraea)	1.59-2.12 lb/ 100 gal [max. 16.96 lb/A] (12.5-53% WP)	Foliar or postharvest application. For red varieties, apply to foliage before or after harvest. For yellow varieties, apply to foliage after harvest once every 2 to 3 years as needed. A suitable oil spreader may be added for postharvest applications.

BASIC COPPER SULFATE

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
	Apple (continued)		
FEAJVAG	Apple scab (Venturia)	0.53-0.66 lb/ 100 gal [with hydrated lime] or 0.18 lb/ 100 gal [without hydrated lime] (53% WP) or 1.0-2.0 lb/ 100 gal (12.5% WP)	Delayed dormant application. Apply in delayed dormant.
FEAJVAG	Apple scab (Venturia)	0.53-0.795 lb/100 gal (53% WP) or 0.51-2.04 lb/ 100 gal (12.5-12.75% WP) 0.22-0.33 lb/ 100 gal (7% WP/D) OR MAI 0.58 lb/ 100 gal (3.2% WP)	Foliar application. Add hydrated lime to 53 percent formulations. Apply at petal fall. Repeat through fourth cover spray or as needed. OR MAI Formulated with lead arsenate and sulfur.
FIADGAP	Bitter rot (Glomerella)		
FIBFPCH	Black rot of fruit and frogeye		
FMAVPCH	leaf spot (Physalospora)		
FCAAPCE	Blotch (Phyllosticta)		
FFACQBB	Powdery mildew		
FMAIMCO	Brook's fruit spot (Mycosphaerella)	0.53 lb/ 100 gal (53% WP)	Foliar application. Add hydrated lime. Apply in late cover sprays.
FIAQNAK	Bullseye fruit rot (Neofabraea)	2.12 lb/ 100 gal (53% WP)	Postharvest application. Apply after harvest. Add a suitable oil spreader.

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
	Apple (continued)		
FBANEBI	Fire blight (Erwinia)	0.11-0.285 lb/100 gal (19-53% WP) or 1.06 lb/A [concentrate] (53% WP) or 0.8-1.14 lb/A (3.8-6.7% D) or 1.8-2.76 lb/A (6% D) OR MAI 0.19-0.285 lb/100 gal [max. 1.14 lb/A] (19% WP)	Foliar application. Apply at 10 percent bloom. Repeat at 5 day intervals until late bloom is over. OR MAI Formulated with zinc sulfate, basic.
FCAFGAL	Sooty blotch (Gloeodes)	0.66 lb/100 gal (53% WP)	Foliar application. Add hydrated lime. Apply in late cover sprays. Under conditions where copper injury is likely to occur, add additional lime.
/05001AA	Apricot		Exempt Apply through 21.2 pounds per acre. Do not apply when trees are in full leaf.
FBADMCB	Brown rot blossom and twig blight (Monilinia)	1.97-4.24 lb/100 gal [max. 21.2 lb/A] (12.5-53% WP) (7% WP/D) (4.24 lb/gal FlC) or 1.0-1.5 lb/100 gal (3 lb/gal FlC) or	Delayed dormant and foliar application. Add a suitable spreader-sticker. For shothole, apply as a fall or winter spray (after most leaves have fallen, but before first rains). Repeat in red bud to popcorn. For brown rot, apply red bud through prejacket. OR MAI Formulated with sulfur; or zinc sulfate, basic.

EPA Index to Pesticide Chemicals

BASIC COPPER SULFATE

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
	Apricot (continued)		
		2.85-3.23 lb/A (3.8% D) (7% WP/D) or concentrate: 4.24-6.36 lb/A (4.24 lb/gal FlC) or 3.0-3.5 lb/A (3 lb/gal FlC) OR MAI 1.52-1.71 lb/100 gal (19% WP) or 0.48-0.72 lb/100 gal (0.48 lb/gal or 4.4% FlC)	
/28000AA	Avocado		Exempt Do not apply later than 140 days after bloom through 21.2 pounds per acre.
FAAAGAP	Anthracnose (Glomerella)	0.15-2.12 lb/100 gal [max. 21.2 lb/A] (50-53% WP) (4.24 lb/gal FlC) or 1.0 lb/100 gal (3 lb/gal FlC)	Foliar application. Apply when blossom buds open. Repeat at 4 week intervals for a total of 5 applications. A suitable spreader may be added.
FMAWCBM	Cercospora fruit spot (blotch)		
FEAJSCB	Scab (spot anthracnose) (Sphaceloma)		

BASIC COPPER SULFATE

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
/06002AA	**Banana**		Exempt No preharvest interval through 1.3 pounds per acre.
FMAWPCR	Black pitting (Piricularia)	2.6 lb/ 100 gal (52% WP)	Foliar application. Apply the first and second week after emergence. Apply directly to the fruit stems and include the basal portion of the leaf crown.
FMBOCBM	Sigatoka disease (Cercospora leaf spot)	1.3 lb/ 3 gal/A (52% WP)	Foliar application. Add a suitable spreader. Apply on a 14 day schedule during the wet season and a 21 day schedule during dry season.
/28063AA	**Barley**		Exempt No preharvest interval through 1.04 pounds per 100 gallons.
FCAGHAM	Helminthosporium spot blotch	1.04 lb/ 100 gal (52% WP)	Foliar application. Apply at early heading and again 10 days later.
FCADSBL	Septoria leaf blotch		
/28001AA	**Beans** (dry, green, and lima)		Exempt No preharvest interval through 3.975 pounds per acre.
FMABIAH	Angular leaf spot (Isariopsis)	0.53-2.12 lb/A or 1.04-2.12 lb/100 gal [max. 3.975 lb/A] (12.75-53% WP) (3-4.24 lb/gal FlC) or 2.0-2.8 lb/A (7-8% D) OR MAI 0.7-1.4 lb/ 100 gal (5-7% WP/D) or	Foliar application. Apply when plants are 5 inches high or when disease first appears. Repeat at 5 to 10 day intervals. OR MAI Formulated with one or a combination of: maneb; methylated napthalenes; carbaryl; malathion; 0,0-diethyl 0-(2-isopropyl-6-methyl-4-pyrimidinyl) phosphorothioate; piperonyl butoxide, technical; pyrethrins; rotenone (and other cube resins); or sulfur.
FAAACDP	Anthracnose (Colletotrichum)		
FBAAXAA	Bacterial (common) blight (Xanthomonas)		
FBARPDZ	Bacterial halo blight (Pseudomonas)		
FFABPCN	Downy mildew (Phytophthora)		
FFACQBB	Powdery mildew		

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	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
	Beans (continued)		
		0.68-2.8 lb/A (3.4-7% D) (5-7% WP/D) or 0.24 lb/A (0.48 lb/gal or 4.4% FlC)	
FJAAUAH	Rust (Uromyces)	0.6-1.36 lb/A (2-3.4% D) or 3.25-3.9 lb/A (6.5% D)	Foliar application. Formulated with carbaryl; sulfur; or maneb and sulfur.
/28002AA	Beets		Exempt No preharvest interval through 3.71 pounds per acre.
FFABPAU FBAAQBB FMBCQBB	Downy mildew (Peronospora) Leaf blights Leaf spots	1.0-2.12 lb/A or 1.56-1.59 lb/100 gal [max. 3.71 lb/A] (52-53% WP) (3-4 lb/gal FlC) or 2.1-3.6 lb/A (7-8% D) OR MAI 2.45-3.5 lb/A (5-7% D) or 0.24 lb/A (0.48 lb/gal or 4.4% FlC)	Foliar application. Apply when disease first appears. Repeat at 7 to 10 day intervals. OR MAI Formulated with methoxychlor, technical; malathion; or sulfur.

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
/01002AA	Blackberry		Exempt No preharvest interval through 3.18 pounds per acre per application.
/01003AA	Boysenberry		
/01004AA	Dewberry		
/01005AA	Loganberry		
/01006AA	Raspberry		
FAAAEAH	Anthracnose (Elsinoe)	1.0-3.18 lb/100 gal [max. 3.18 lb/A/application] (12.75-53% WP) (3-4.24 lb/gal FlC)	Delayed dormant, foliar, and postharvest application. For anthracnose, apply low rate when leaf buds begin to open. Repeat when flower buds show white and continue at 10 to 14 day intervals. For leaf and cane spot, apply 1.0 to 3.18 pounds when leaf buds begin to open. Repeat when flowers begin to open. For yellow rust, apply 3.18 pounds when leaf buds swell and when flowers open. For leaf and cane spot, and yellow rust, apply 3.18 pounds as a postharvest spray after pruning and before fall rains.
FMAMSEL	Leaf and cane spot (Septoria)		
FJAPKAH	Yellow rust (Kuehneola)		
	Boysenberry	See Blackberry cluster.	
/13005AA	Broccoli		Exempt No preharvest interval through 3.2 pounds per acre.
/13006AA	Brussels Sprouts		
/13007AA	Cabbage		
/13008AA	Cauliflower		
FFABPAU	Downy mildew (Peronospora)	0.53-2.12 lb/A or 1.14-1.52 lb/100 gal [max. 3.18 lb/A] (19-53% WP) (7% WP/D) (3-4.24 lb/gal FlC) or 1.575-3.2 lb/A (6.3-8% D) (7% WP/D) or	Foliar application. Apply when plants are above ground in plant bed or before disease normally appears. Repeat at 7 to 10 day intervals in plant bed and field. OR MAI Formulated with methoxychlor, technical; carbaryl; malathion; rotenone (and other cube resins); sulfur; maneb and 0,0-diethyl 0-(2-isopropyl-6-methyl-4-pyrimidinyl) phosphorothioate; or carbaryl.
FMBCQBB	Leaf spots		

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
	Broccoli cluster (continued)		
		OR MAI 0.7 lb/ 100 gal (7% WP/D) or 1.0-3.15 lb/A (3.4-7% D) (7% WP/D) or 0.24 lb/A (0.48 lb/gal or 4.4% FlC)	
	Brussels Sprouts	See Broccoli cluster.	
	Cabbage	See Broccoli cluster.	
/28073AA	Carrots		Exempt No preharvest interval through 3.975 pounds per acre. The addition of hydrated lime to sprays is recommended.
FFABPCV	Downy mildew (Plasmopara)	1.0-2.12 lb/A or 0.93-2.12 lb/100 gal [max. 3.975 lb/A] (52-53% WP) (7% WP/D) (3-4.24 lb/ gal FlC) or 2.1-3.6 lb/A (7-8% D) (7% WP/D) OR MAI 0.75-3.15 lb/A (3.5-7% D) or 0.24 lb/A (0.48 lb/gal or 4.4% FlC)	Foliar application. Apply when disease first appears. Repeat at 7 to 10 day intervals. OR MAI Formulated with one or a combination of: maneb; methoxychlor, technical; parathion; malathion; or sulfur.
FBAMCBM	Early blight (Cercospora)		
FBASAAX	Late blight (Alternaria)		
	Cauliflower	See Broccoli cluster.	

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
/28003AA	Celery		Exempt No preharvest interval through 5.3 pounds per acre.
FBAAPDZ	Bacterial blight (Pseudomonas)	1.0-2.12 lb/A or 1.0-2.65 lb/100 gal [max. 5.3 lb/A] (12.5-53% WP) (7% WP/D) (1-4.24 lb/gal FlC) or 1.4-3.5 lb/A (3.8-8% D) (7% WP/D) OR MAI 0.7-1.71 lb/100 gal (19% WP) (7% WP/D) or 0.75-3.5 lb/A (3.5-7% D) (7% WP/D)	Foliar application. Apply in plant bed or field when plants are 6 inches high or disease first appears. Repeat at 5 to 14 day intervals as needed. May be tank mixed with mancozeb, maneb, or chlorothalonil. OR MAI Formulated with one or a combination of: calcium arsenate; maneb; methylated napthalenes; carbaryl; parathion; malathion; piperonyl butoxide, technical; pyrethrins; rotenone (and other cube resins); sulfur; or zinc sulfate, basic.
FBAMCBM	Early blight (Cercospora)		
FBASSEL	Late blight (Septoria)		
FMBCQBB	Leaf spots		
/05002AA	Cherry (sour)	-	Exempt Do not apply to sweet cherries or the English Morelo variety as severe injury will occur.
FDAAPDZ	Bacterial canker (gummosis) (Pseudomonas)	0.44-1.1 lb/100 gal (22% WP) or 3.9-6.24 lb/A (0.39 lb/gal or 4.15% FlC)	Postharvest application. To aid in the control of bacterial canker, apply low rates at beginning of leaf fall and high rates at end of leaf fall.

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
	Cherry (sour) (continued)		
FBADMCB	Brown rot blossom and twig blight (Monilinia)	1.54-2.65 lb/ 100 gal [max. 26.5 lb/A] (22-53% WP) (7% WP/D) (3-4.24 lb/ gal FlC) or 0.51-1.06 lb/ 100 gal or 1.325 lb/A (12.5-53% WP) (4.24 lb/gal FlC) or -- [dust] (7% WP/D) OR MAI 1.52-1.71 lb/ 100 gal (19% WP)	Delayed dormant and foliar application. Apply at popcorn and late bloom (add hydrated lime in late bloom spray). Add a suitable spreader-sticker. OR MAI Formulated with zinc sulfate, basic.
FIALMCB	Brown rot of fruit (Monilinia)		
FMBCCDJ	Cherry leaf spot (Coccomyces)	1.06-2.65 lb/ 100 gal (52% WP) (3-4.24 lb/ gal FlC) or 0.51-1.0 lb/ 100 gal or 1.325 lb/A (12.5-53% WP)	Foliar and postharvest application. Apply at petal fall (with hydrated lime). Apply once or twice post-harvest.
FBAZCEL	Coryneum blight (shothole)	2.0-3.18 lb/ 100 gal (53% WP) (3-4.24 lb/ gal FlC) or 3.9-6.24 lb/A (0.39 lb/gal or 4.15% FlC)	Dormant application. Apply as a dormant spray. Add a suitable spreader-sticker.

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	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
/02000AA	Citrus Fruits		Exempt Do not apply later than 3 weeks after petal fall through 33.92 pounds per acre; or through 0.795 pound per 100 gallons 4 weeks after that. Basic copper sulfate should not be applied where copper injury is known to occur. The use of copper and oil combinations should be avoided after the fruit has attained a size of 0.75 inch in diameter and during hot weather. Application rates and timing, disease occurrence, and cautions for specific varieties will vary with locality. A suitable spreader-sticker may be added.
FMAHPDZ	Bacterial blast (Pseudomonas) (in northern CA)	1.1-2.2 lb/ 100 gal [max. 30.8 lb/A] (22% WP)	Foliar application. Apply in October-November before the first rain. Spray entire tree. Do not apply to Mandarins until after fruit has been picked.
FGAJPCN	Brown rot (gummosis) (Phytophthora)	0.25-1.59 lb/ 100 gal [max. 33.92 lb/A] (12.5-53% WP) (1-4.24 lb/ gal FlC) or aerial or concentrate: 5.0-13.25 lb/A (50-53% WP) (3-4.24 lb/ gal FlC) OR MAI 0.24-1.26 lb/ 100 gal (6.3-19% WP) (7% WP/D) (0.48 lb/gal or 4.4% FlC) or	Foliar and postharvest application. For brown rot, apply by ground equipment. Hydrated lime and zinc sulfate may be added. For brown rot and Septoria spot, apply before rains or at first sign of disease. Use lowest rate in CA where copper injury may be a problem or groves are fumigated with hydrogen cyanide. Use up to 0.795 pound elsewhere. For brown rot gummosis, spray ground and skirts of trees to a height of 3 to 4 feet, or use a paint-like mixture on trunk and crown. For melanose and scab, apply at higher half of dose range. May be tank mixed with sulfur. For melanose, apply up to 0.795 pound, 1 to 3 weeks after petal fall and repeat 4 weeks later if needed. For scab, apply just before trees begin to flush and repeat at two-thirds petal fall. For greasy spot or pink pitting, apply at lower half dose range
FMAYMCO	Greasy spot (Mycosphaerella)		
FMCBSEL	Leaf and fruit spot (Septoria)		
FIBLDAD	Melanose (Diaporthe)		
FIBLDAP	Pink pitting of grapefruit (Mycosphaerella)		
FAABEAH	Scab (spot anthracnose) (Elsinoe)		

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
	Citrus Fruits (continued)		
		-- (7% WP/D)	anytime during the 2 months after expansion of early spring flush and within 1 month after expansion of late spring or other flushes; or, apply 1 summer spray. OR MAI Formulated with sulfur; or zinc sulfate, basic.
FMBLCGA	Red alga (Cephaleuros) (in FL)	0.75-0.795 lb/100 gal (50% WP) (4.24 lb/gal FlC)	Foliar application. A suitable spreader-sticker may be added. Apply in the early summer (June) as a preventative spray. Repeat in late summer (early August) to control new colonies.
/01010AA	Cranberry		Exempt No preharvest interval through 5.2 pounds per acre.
FIBFQBB	Fruit rots	5.2 lb/A (52% WP)	Use limited to WI. Foliar application. Apply beginning in late bloom. Additional applications may be required. Consult a State Agricultural Cooperative Extension Service Agent.

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	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
/10000AA	Cucurbits (cucumbers, melons, pumpkin, squash)		Exempt No preharvest interval through 6.36 pounds per acre. Consult a State Agricultural Cooperative Extension Service regarding the addition of hydrated lime.
FBATAAX	Alternaria leaf blight	0.75-2.12 lb/A or 0.75-2.65 lb/100 gal [max. 6.36 lb/A] (12.5-53% WP) (7% WP/D) (3-4.24 lb/gal FlC) or 0.75-3.85 lb/A (5-8% D) (7% WP/D) OR MAI 0.7-1.4 lb/100 gal (5-7% WP/D) or 0.7-3.5 lb/A (3.5-7% D) (7% WP/D) or 0.06-0.12 lb/A (0.48 lb/gal or 4.4% FlC)	Soil or foliar application. A soil application after planting but before emergence may help decrease infections of angular leaf spot, anthracnose, and Alternaria leaf spot. Otherwise, apply at lower rates when plants emerge or begin to vine, or before diseases appear. Repeat at 7 to 10 day intervals (or more frequently if needed), increasing to higher rates for maturing high plant populations (40,000 plants per acre). A 7 percent dust may be mixed with zineb. OR MAI Formulated with one or a combination of: lindane (gamma isomer of benzene hexachloride); calcium arsenate; maneb; methoxychlor, technical; methylated napthalenes; carbaryl; parathion; malathion; O,O-diethyl O-(2-isopropyl-6-methyl-4-pyrimidinyl) phosphorothioate; piperonyl butoxide, technical; pyrethrins; rotenone (and other cube resins); endosulfan; or sulfur.
FMABPDZ	Angular leaf spot (Pseudomonas)		
FAAACOP	Anthracnose (Colletotrichum)		
FGATEBI	Bacterial wilt (Erwinia)		
FFABPEA	Downy mildew (Pseudoperonospera)		
FBAQMCO	Gummy stem blight (Mycosphaerella)		
FMBCQBB	Leaf spots		
FFACEBJ	Powdery mildew (Erysiphe)		
FEAJCCV	Scab (Cladosporium)		

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	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
/01011AA /01013AA	Currant Gooseberry		Exempt No preharvest interval through 0.7 pound per 100 gallons; or through 7.42 pounds per acre 2 weeks after bloom.
FAAAPEB FMBCQBB	Anthracnose (Pseudopeziza) Leaf spots	0.66-0.7 lb/100 gal (12.75-53% WP) OR 3.125-3.18 lb/100 gal [max. 7.42 lb/A] (50-53% WP)	Foliar application. Apply at leaf opening. Repeat at 10 to 14 day intervals. OR Foliar and postharvest application. Apply at full bloom, 2 weeks later, and after harvest.
	Dewberry	See Blackberry cluster.	
/11001AA	Eggplant		Exempt No preharvest interval through 3.5 pounds per acre.
FAAACDP FFABPAU FBAMAAX FMBCQBB FBAAPBU	Anthracnose (Colletotrichum) Downy mildew (Peronospora) Early blight (Alternaria) Leaf spots Phomopsis blight	1.0-2.12 lb/A or 0.93-2.12 lb/100 gal [max. 3.445 lb/A] (52-53% WP) (3-4.24 lb/gal FlC) or 2.1-3.6 lb/A (7-8% D) OR MAI 0.7-1.4 lb/100 gal (7% WP/D) or 0.875-3.5 lb/A (3.4-7% D) (7% WP/D) or 0.24 lb/A (0.48 lb/gal or 4.4%)	Foliar application. Apply in plant bed or in field before disease appears. Repeat at 7 to 10 day intervals. OR MAI Formulated with one or a combination of: maneb; methoxychlor, technical; methylated napthalenes; carbaryl; malathion; piperonyl butoxide, technical; pyrethrins; rotenone (and other cube resins); or sulfur.

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
/03005AA	**Filbert**		Exempt Postharvest application through 3.18 pounds per 100 gallons.
FBAAXAA	Bacterial blight (Xanthomonas)	3.12-3.18 lb/ 100 gal (50-52% WP) (4.24 lb/gal FlC)	Postharvest application. Apply by ground equipment. Add a suitable spreader-sticker. Apply in late August - early September before first heavy rain. If heavy fall rains occur, repeat spray after three-quarters of leaves have dropped.
	Gooseberry	See Currant cluster.	
/01014AA	**Grapes**		Exempt No preharvest interval through 4.24 pounds per acre.
FAAAEAH	Anthracnose (Elsinoe)	1.0-1.59 lb/ 100 gal [max. 4.24 lb/A] (12.5-53% WP) (4.24 lb/gal FlC) or 0.5 lb/ 100 gal (3 lb/gal FlC) or 1.4-3.5 lb/A (6-7% D) or concentrate: 2.12-2.65 lb/A (53% WP) (4.24 lb/gal FlC) or 1.0-1.59 lb/A (3-4.24 lb/ gal FlC) OR MAI 0.7-1.4 lb/ 100 gal (7% WP/D) or	Delayed dormant and foliar application. Apply when new growth is 0.5 inch long. Repeat at 10 to 14 day intervals. The addition of hydrated lime may be recommended. OR MAI Formulated with maneb; methoxychlor, technical; carbaryl; parathion; rotenone (and other cube resins); or sulfur.
FIADMAV	Bitter rot (Melanconium)		
FIBFGBG	Black rot (Guignardia)		
FFABPCV	Downy mildew (Plasmopara)		

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
	Grapes (continued)		
		1.75-3.5 lb/A (3.5-7% D) (7% WP/D)	
FIARBAW	Bunch rot (Botrytis)	1.06 lb/A [dust] (53% WP)	Foliar application. Mix with sulfur. Add zinc sulfate. Apply at buckshot stage. Repeat monthly until harvest.
FDAMCEY	Dead arm (Cryptosporella)	1.99 lb/ 100 gal (53% WP)	Delayed dormant application. Add hydrated lime. Apply as soon as green tips show.
FFACUAB	Powdery mildew (Uncinula)	2.65-3.18 lb/ A [dust] (53% WP)	Foliar application. Prepare dust with a suitable diluent. Apply when disease appears.
/08020AA	Hops		Exempt Two week preharvest interval through 1.04 pounds per 100 gallons as a spray or 4.0 pounds per acre as a dust.
FFABPEA	Downy mildew (Pseudoperonospora)	1.04 lb/ 100 gal (52% WP) or 1.0 lb/A (3 lb/gal FlC) or 3.2-4.0 lb/A (8% D)	Foliar application. Apply as a crown treatment (after pruning but before training). Additional treatments at 10 day intervals may be needed.

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
/13020AA	Lettuce		Exempt No preharvest interval through 2.65 pounds per acre.
FAAAMAH	Anthracnose (Marsonnina)	0.93-1.59 lb/ 100 gal [max. 2.65 lb/A] (19-53% WP) or 0.26 lb/ 100 gal (52% WP) or 1.52-2.27 lb/A (3.8-6.3% D) OR MAI 0.0525-0.0875 lb/1,000 sq.ft (7% D)	Foliar application. Apply before disease appears. Repeat at 7 to 10 day intervals. OR MAI Formulated with carbaryl.
FFABBBA	Downy mildew (Bremia)		
FMBCCBM	Leaf spot (Cercospora)		
	Loganberry	See Blackberry cluster.	
/06007AA	Mango		Exempt No preharvest interval through 2.12 pounds per 100 gallons.
FAAAGAP	Anthracnose (Glomerella)	1.5-2.12 lb/ 100 gal (50-53% WP) (4.24 lb/gal FlC)	Foliar application. Apply when first bloom clusters have appeared. Repeat weekly until fruit sets and then spray monthly for a total of 5 to 12 applications depending upon area.
FEAJEAH	Scab (spot anthracnose) (Elsinoe)		
/05003AA	Nectarine		Exempt Do not apply after pink bud or after trees are in leaf through 15.84 pounds per acre.
/05004AA	Peach		
FGAYQAA	Bacterial diseases (on peach)	1.5-2.12 lb/ 100 gal (50-53% WP) (4.24 lb/gal FlC) or	Dormant application. Add a suitable spreader-sticker. Apply during dormant season.

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
	Nectarine cluster (continued)		
		1.0 lb/ 100 gal (3 lb/gal FlC)	
FBADMCB FEAGTAB FBAZCEL	Brown rot blossom and twig blight (Monilinia) Leaf curl (Taphrina) Shothole (Coryneum blight)	1.54-3.18 lb/ 100 gal [max. 15.84 lb/A] (12.5-53% WP) (4.24 lb/ gal FlC) or 1.0-1.5 lb/ 100 gal (0.39 lb/gal or 4.4% FlC) (3 lb/gal FlC) or concentrate: 4.24-8.48 lb/A (50-53% WP) (4.24 lb/gal FlC) or 3.0-4.0 lb/A (3 lb/gal FlC) or CA, aerial, dormant: 8.0-10.6 lb/ 20 gal/A (50-53% WP) or 4.75-9.5 lb/A (19% WP) OR MAI 1.52-1.71 lb/ 100 gal (19% WP) or 1.02-1.36 lb/A (3.4% D)	Dormant and delayed dormant application. Add a suitable spreader-sticker. For leaf curl and shothole, during the dormant season (before fall rains). For brown rot and shothole, apply before bud swell and in full pink bud stage. OR MAI Formulated with zinc sulfate, basic; or carbaryl and sulfur.

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
/28014AA	Olive		Exempt No preharvest interval through 6.36 pounds per acre. In areas with 10 inches or less rainfall per year, use up to 1.06 pounds per 100 gallons.
FMBHCFK	Peacock spot (Cycloclonium)	2.12-4.24 lb/A or 0.44-3.18 lb/100 gal [max. 6.36 lb/A] (22-53% WP) (3-4.24 lb/gal FlC)	Foliar application. Apply in late October.
/14011AA	Onion		Exempt No preharvest interval through 3.5 pounds per acre.
FFABPAU	Downy mildew (Peronospora)	1.0-2.12 lb/A or 0.93-1.59 lb/100 gal [max. 3.445 lb/A] (19-53% WP) (3-4.24 lb/gal FlC) or 1.14-3.5 lb/A (3.8-7% D) OR MAI 0.0875-3.5 lb/A (3.5-7% D)	Foliar application. Apply when plants are 4 to 6 inches high. Repeat at 7 to 10 day intervals. Mix the 7 percent dust formulation with sulfur, or maneb, zineb, or thiram. OR MAI Formulated with one or a combination of: maneb; parathion; malathion; 0,0-diethyl 0-(2-isopropyl-6-methyl-4-pyrimidinyl) phosphorothioate; or sulfur.
FMBCQBB	Leaf spots		
FCAEAAX	Purple blotch (Alternaria)		
/06010AA	Papaya		Exempt No preharvest interval through 0.795 pounds per 100 gallons.
FAAACDP	Anthracnose (Colletotrichum)	0.795 lb/100 gal (53% WP)	Foliar application. Apply before disease is expected to appear. Repeat at 10 to 14 day intervals or at 5 to 7 day intervals during periods of heavy rainfall.
	Peach	See Nectarine cluster.	

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
/28015AA	Peanuts		Exempt No preharvest interval through 2.12 pounds per acre.
FMBCCBM	Cercospora leaf spot	0.75-2.12 lb/A (52-53% WP) (1-4.24 lb/gal FlC) or 0.73-1.24 lb/A [dust] (52-53% WP) OR MAI 0.24-0.4 lb/A (4% WP) (0.11-0.53 lb/gal FlC) (0.48 lb/gal or 4.4% FlC) or 0.51-1.02 lb/A (3-4% D) or 1.2-1.6 lb/A (4% D)	Foliar application. Sprays may be tank mixed with sulfur. When dusting is preferred, mix with sulfur. Apply when disease appears. Repeat at 10 to 14 day intervals. OR MAI Formulated with sulfur; or carbaryl and sulfur.
/04003AA	Pear		Exempt No preharvest interval through 1.99 pounds per 100 acres.
FAAANAK	Anthracnose (Neofabraea)	2.0 lb/ 100 gal (50% WP)	Postharvest application. Add a suitable oil spreader.
FDAPNAK	Perennial canker (Neofabraea)		
FMAHPDZ	Bacterial blight (Pseudomonas)	1.5-2.625 lb/ 100 gal (3 lb/gal FlC)	Postharvest and dormant application. Apply before fall rains and again at dormant before spring growth starts.
FIAQNAK	Bullseye rot (Neofabraea)	1.99 lb/ 100 gal (53% WP)	Foliar application. Apply before harvest. Add a suitable oil spreader.

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	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
	Pear (continued)		
FBANEBI	Fire blight (Erwinia)	0.125-0.27 lb/100 gal [400 gal/A] (12.75-53% WP) (3-4.24 lb/gal FlC) or 0.75-1.89 lb/A (3-6.7% D) OR MAI 0.19-0.285 lb/100 gal [max. 1.14 lb/A] (19% WP) (0.48 lb/gal or 4.4% FlC)	Foliar application. May be applied in concentrate sprayers. Apply at 10 percent bloom. Repeat at 5 to 7 day intervals during bloom. OR MAI Formulated with sulfur; or zinc sulfate, basic.
FBATFAA FEAJVAG	Leaf blight (Fabraea) Pear scab (Venturia)	0.66-1.0 lb/100 gal (12.5% WP) (7% WP/D) or -- (7% WP/D)	Foliar application. Add hydrated lime. Apply in first 3 cover sprays.
		1.89 lb/A (6.3% D)	Delayed dormant and foliar application. For scab, apply in cluster bud, bloom and petal fall or at other times prior to rain.
/28016AA	Peas		Exempt No preharvest interval through 3.18 pounds per acre.
FFABPAU FMBCQBB	Downy mildew (Peronospora) Leaf spots	0.93-1.59 lb/100 gal [up to 200 gal/A] (53% WP) OR MAI -- (7% D)	Foliar application. Apply before diseases appear. Repeat at 7 to 10 day intervals. OR MAI Formulated with carbaryl and rotenone (and other cube resins).

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
	Peas (continued)		
FFACERJ	(Blackeyed) Powdery mildew (Erysiphe)	1.04-1.56 lb/100 gal (52% WP)	Foliar application. Apply at first sign of disease. Repeat at 7 day intervals.
/03008AA	**Pecan**		Exempt No preharvest interval through 1.06 pounds per 100 gallons.
FEAJCCV	Pecan scab (Cladosporium)	1.06 lb/ 100 gal (53% WP)	Foliar application. Apply as a foliar spray according to current state schedule for timing and limits.
		0.75-0.765 tbls actual*/gal (12.5-12.75% WP)	Foliar application. Apply when catkins show. Repeat 3 to 4 times at 3 week intervals.
/28017AA	**Peppers**		Exempt No preharvest interval through 5.0 pounds per acre.
FAAACDP	Anthracnose (Colletotrichum)	1.0-2.12 lb/A or 1.0-2.5 lb/100 gal [max. 5.0 lb/A] (33-53% WP) (1-4.24 lb/ gal F1C) or 2.1-3.6 lb/A (7-8% D) OR MAI 2.12 lb/ 100 gal (30.25% WP) or 0.875-3.5 lb/A (3.4-7% D) or 0.24 lb/A (0.48 lb/gal or 4.4% F1C)	Foliar application. Apply in seed bed before disease appears and continue in the field at 7 day intervals. OR MAI Formulated with one or a combination of: maneb; methoxychlor, technical; carbaryl; malathion; rotenone (and other cube resins); sulfur; endosulfan; or captan.
FMAAXAA	Bacterial spot (Xanthomonas)		
FFABPAU	Downy mildew (Peronospora)		
FBAMAAX	Early blight (Alternaria)		
FMBCCBM FMAVCBM	Leaf spot (frogeye leaf spot) (Cercospora)		
FBAAPCN	Phytophthora blight		

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
/05005AA	Plum		Exempt
/05006AA	Prune		Do not apply later than second cover through 6.36 pounds per acre.
FEAADAS	Black knot (Dibotryon)	1.06-1.59 lb/100 gal [max. 6.36 lb/A] (53% WP)	Delayed dormant and foliar application. Add hydrated lime. Apply at green tip stage. Repeat at shuck-shed and in 2 cover sprays if disease is serious.
FBADMCB	Brown rot blossom blight (Monilinia)	0.795-1.325 lb/100 gal (12.5-53% WP)	Delayed dormant and foliar application. Add hydrated lime. Apply Apply just before blossoms open. Repeat at shuck split and again in 2 to 3 weeks.
FMBCQBB	Leaf spot		
FBADMCB	Brown rot (Monilinia)	2.08-3.18 lb/100 gal [max. 13.25 lb/A] (52-53% WP) (4.24 lb/gal FlC) or 1.0-1.5 lb/100 gal (3 lb/gal FlC) or concentrate: 6.36 lb/A (53% WP) (4.24 lb/gal FlC) or 3.0 lb/A (3 lb/gal FlC) or	Dormant, delayed dormant, and foliar application. Add a suitable spreader-sticker. Apply in dormant season. For brown rot, also apply at greenbud to full bloom. OR MAI Formulated with zinc sulfate, basic.
FBAZCEL	Shothole (Coryneum blight)		

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
	Plum cluster (continued)		
		CA, aerial, dormant: 8.48-10.6 lb/A (53% WP) (4.24 lb/gal FlC) or 4.0-5.0 lb/A (3 lb/gal FlC) OR MAI 1.52-1.71 lb/100 gal (19% WP)	
/14013AA	Potato		Exempt No preharvest interval through 6.36 pounds per acre.
FBAMAAX	Early blight (Alternaria)	1.5-3.18 lb/A or 1.0-2.65 lb/100 gal [max. 6.36 lb/A] (12.5-53% WP) (7% WP/D) (3-4.24 lb/gal FlC) or 1.05-4.2 lb/A (6.3-8% D) (7% WP/D) OR MAI 0.7-1.4 lb/100 gal (7% WP/D) or 0.7-3.9 lb/A (3.4-7% D) (7% WP/D) or 0.24-0.36 lb/A (0.48 lb/gal or 4.4% FlC)	Foliar application. Apply when plants emerge. Repeat at 7 to 10 day intervals or more often for severe late blight. OR MAI Formulated with one or a combination of: calcium arsenate; maneb; methoxychlor, technical; methylated napthalenes; carbaryl; parathion; malathion; O,O-diethyl O-(2-isopropyl-6-methyl-4-pyrimidinyl) phosphorothioate; piperonyl butoxide, technical; pyrethrins; rotenone (and other cube resins); sulfur; or endosulfan.
FBASPCN	Late blight (Phytophthora)		

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
	Prune	See Plum cluster.	
	Raspberry	See Blackberry cluster.	
/28072AA	Rice		Exempt No preharvest interval through 0.24 pound per acre.
FMAHPCR	Blast (Piricularia)	0.24 lb/A (0.48 lb/gal or 4.4% FlC)	Foliar application. As an aid in disease control, apply at panicle initiation. Repeat at 14 day intervals. Formulated with sulfur.
FMBCHAM	Brown leaf spot (Helminthosporium)		
FMDHRAM	Brown bordered leaf and sheath spot (Rhizoctonia)		
FLANEAZ	Leaf smut (Entyloma)		
FMBCCBM	Narrow brown leaf spot (Cercospora)		
FBEMRAM	Sheath blight (Rhizoctonia)		
FICHSAS	Stem rot (Sclerotium)		
/28023AA	Soybeans		Exempt No preharvest interval through 0.24 pound per acre.
FAAAGAP	Anthracnose (Glomerella)	0.24 lb/A (0.48 lb/gal or 4.4% FlC)	Foliar application. As an aid in disease control, apply at pods are one-eighth to one-half inch long (early pod set). Repeat at 10 to 14 day intervals throughout the growing season. Formulated with sulfur.
FICHCBF	Brown stem rot (Cephalosporium)		
FBAYDAP	Diaporthe pod and stem blight		
FMAVCBM	Leaf spot (Cercospora)		

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
/13024AA	Spinach		Exempt No preharvest interval through 3.2 pounds per acre.
FAAACDP	Anthracnose (Colletotrichum)	1.0-2.12 lb/A [max. 150 gal/A] (52-53% WP) (3-4.24 lb/gal FlC) or 2.4-3.2 lb/A (6.3-8% D) OR MAI 1.25-3.5 lb/A (5-7% D) or 0.24 lb/A (0.48 lb/gal or 4.4% FlC)	Foliar application. Apply before or when disease first appears. Repeat at 7 to 10 day intervals. OR MAI Formulated with one or a combination of: carbaryl; sulfur; or maneb and sulfur.
FFABPAU	Downy mildew (blue mold) (Peronospora)		
FMBCCBM	Leaf spot (Cercospora)		
FGARAAV	White rust (Albugo)		
/01016AA	Strawberry		Exempt No preharvest interval through 3.975 pounds per acre.
FAAACDP	Anthracnose (Colletotrichum)	1.06-2.12 lb 100 gal (53% WP)	Delayed dormant and postharvest application. Add hydrated lime. Apply 1.06 to 1.59 pounds preblossom, and 1.59 to 2.12 pounds postharvest.
FFABPAU	Downy mildew (Peronospora)	1.0-2.12 lb/100 gal [max. 3.975 lb/A] (12.5-53% WP) (3-4.24 lb/gal FlC) (7% WP/D) or 2.205-3.15 lb/A (6.3% D) (7% WP/D) OR MAI 0.7 lb/100 gal (7% WP/D) or	Delayed dormant and foliar application. Apply after leaves form at 10 to 14 days intervals. OR MAI Formulated with carbaryl; rotenone (and other cube resins); or carbaryl and sulfur.
FBATDAH	Leaf blight (Dendrophoma)		
FGAKDBS	Leaf scorch (Diplocarpon)		
FMBCMCO	Leaf spot (Mycosphaerella)		

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
	Strawberry (continued)		
		1.02-3.04 lb/A (3.4-7% D) (7% WP/D)	
/28020AA	Sugar Beets		Exempt No preharvest interval through 3.18 pounds per 100 gallons.
FFABPAU	Downy mildew (Peronospora)	1.0-3.18 lb/A or 2.04-3.18 lb/100 gal (50-53% WP) (3-4.24 lb/gal FlC) OR MAI 0.24-0.48 lb/A (0.48 lb/gal or 4.4% FlC)	Foliar application. Apply when plants are 4 to 6 inches high or when disease first appears. Repeat at 7 to 10 day intervals. OR MAI Formulated with sulfur.
FMBCCBM	Leaf spot (Cercospora)		
/26003DA	Tobacco		N.F. No preharvest interval through 2.12 pounds per 100 gallons.
FMABPDZ	Angular leaf spot (Pseudomonas)	0.4 lb/25 gal/100 sq.yd (53% WP)	Use limited to IN, KY, OH, and TN. Foliar application to plant beds. Using a sprinkler can, apply when plants are in 2-leaf stage and again in 7 to 10 days.
FGASPDZ	Wildfire (Pseudomonas)		
FGASPDZ	Wildfire (Pseudomonas)	0.53 lb/10 gal/100 sq.ft or 1.59-2.12 lb/100 gal (53% WP)	Soil and foliar application to plant beds. Apply after sowing seed or when plants emerge. Repeat at 5 to 10 day intervals until transplanted.

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
/11005AA	Tomato		Exempt No preharvest interval through 6.36 pounds per acre.
FAAAGAP FDAACEI FMBPPDZ FMAAXAA FHAGCCV FBAMAAX FBASPCN FMBCSEL FMBCSDG FMBEAAX	Anthracnose (Glomerella) Bacterial canker (Corynebacterium) Bacterial speck (Pseudomonas) Bacterial spot (Xanthomonas) Cladosporium leaf mold Early blight (Alternaria) Late blight (Phytophthora) Leaf spot (Septoria) Leaf spot (Stemphylium) Nailhead spot (Alternaria)	1.0-3.18 lb/A or 1.0-2.625 lb/100 gal [max. 6.36 lb/A] (12.5-53% WP) (7% WP/D) (1-4.24 lb/gal FlC) or 1.05-4.2 lb/A (6.3-8% D) (7% WP/D) OR MAI 0.7-2.12 lb/100 gal (30.25% WP) (5-7% WP/D) or 0.875-3.9 lb/A (3.4-7% D) (5-7% WP/D) or 0.24-0.36 lb/A (0.48 lb/gal or 4.4% FlC)	Foliar application. Apply in plant bed or field before disease appears. Repeat at 4 to 14 day intervals. May be tank mixed mancozeb, maneb, 2,4-dichloro-6-(o-chloroanilino)-s-triazine, or chlorothalonil. OR MAI Formulated with one or a combination of: calcium arsenate; maneb; methoxychlor, technical; methylated napthalenes; carbaryl; parathion; malathion; O,O-diethyl O-(2-isopropyl-6-methyl-4-pyrimidinyl) phosphorothioate; piperonyl butoxide, technical; pyrethrins; rotenone (and other cube resins); sulfur; endosulfan; or captan.
/28024DA	Vegetables (seedlings)		Exempt Plant bed application through 2.12 pounds per 100 gallons.
FKAAQBB	Damping-off	4.24 lb/A or 2.12 lb/100 gal (53% WP)	Soil and foliar application to plant beds. Apply to soil surface in plant beds after emergence. Repeat at 4 to 7 day intervals as needed.

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
'03009AA	Walnut		Exempt No preharvest interval through 23.85 pounds per acre.
'BAAXAA	Bacterial blight (Xanthomonas)	1.0-2.65 lb/ 100 gal [max. 23.85 lb/A] (50-53% WP) (4.24 lb/gal FlC) or 2.0-3.15 lb/A (5-6.3% D)	Delayed dormant and foliar application. Apply in late prebloom just before the majority of the flowers come into full bloom. Apply again in the postbloom periods when plumules at the tips of the nutlets are withering. Repeat 3 to 4 times during the growing season if needed. Lower rates may require additional applications.
'28065AA	Wheat		Exempt No preharvest interval through 1.04 pounds per 100 gallons. Some varieties of wheat may be sensitive to copper.
FCADHAM FMBCSBL	Helminthosporium leaf spot Septoria leaf spot	1.04 lb/ 100 gal (52% WP)	Foliar application. Apply at early heading and again 10 days later.
FJAGPEJ	Leaf rust (Puccinia)	0.24 lb/A (0.48 lb/gal or 4.4% FlC)	Foliar application. Apply when disease first appears. Repeat at 2 week intervals if disease conditions persist. Formulated with sulfur.

(Agricultural Seed Treatment)

General Warnings and Limitations: Do not use treated seed for food, feed, or oil purposes. The Federal Seed Act requires that seed treated with a pesticide must contain a dye which imparts an unnatural color to the seed if the seed is intended to be moved in interstate commerce.

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
/28007AA /28023AA	Cotton (seed) Soybeans (seed)		Exempt Seed treatment through 0.045 pound per 100 pounds seed.
FKAAQBB FKAFQBB	Damping-off Seedling diseases	0.03-0.045 lb/100 lb seed (0.48 lb/gal or 4.4% FlC)	Seed treatment. Apply in planter box or suitable slurry treater.

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
/28072AA	**Rice** (water planted rice seed)		Exempt Seed treatment through 1.06 ounces per 100 pounds seed.
FKAAQBB FKABQBB	Damping-off Seed rot	1.0-1.06 oz/ 100 lb seed (50% WP) (4.24 lb/gal FlC)	Seed treatment. Apply as a slurry using tumblers or mixing devices generally used.
	Soybeans (seed)	See Cotton (seed) cluster.	
/28065AA	**Wheat** (seed)		Exempt Seed treatment through 2.12 ounces per bushel.
FLATTAQ	Common bunt/stinking smut (Tilletia)	Spring wheat: 1.06 oz/bu or Winter wheat: 1.59 oz/bu or Infested winter wheat: 2.12 oz/bu (53% WP)	Seed treatment. Apply as a dry mix to seed.

ORNAMENTALS

(Ornamental Plants (herbaceous plants and bulbs; woody shrubs, trees and vines))

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
/35021AA /35021DA	**Arborvitae**		
/31026AA /31026DA	**Aster**		
FBAAQBB FBAECEL FMBCQBB	Blight Coryneum twig blight Leaf spots	1.0-2.915 lb/ 100 gal/A (12.5-53% WP) or 2.12 lb/A [dust] (53% WP)	Foliar application. Apply in early fall. Repeat in late fall.

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
/35000AA /35000DA	Ornamental and/or Shade Trees (including Arborvitae, Cedar, Cypress, Dogwood, Elm, Juniper, Linden, Maple, Oak, Pine, Spruce, Sycamore, Tuliptree, Willow, and Yew)		
/31003AA /31003DA	Ornamental Flowering Plants (including Aster, Begonia, Carnation, Chrysanthemums, Dalhias, Delphinium, Geranium, Gladiolus, Hollyhock, Iris, Lilies, Marigolds, Nasturtium, Pansies, Peonies, Phlox, Snapdragon, Stocks, Sweet Pea, Tulips, Violets, and Zinnia)		
/34000AA /34000DA	Ornamental Woody Shrubs and Vines (including Azalea, Barberry, Boxwood, Camellia, Gardenia, Hawthorn, Ivy, Laurel, Lilac, Rhododendron hybrids/cultivars, Rose, and Virginia Creeper)		
FAAAQBB	Anthracnose	1.0-2.12 lb/ 100 gal (12.5-53% WP) (7% WP/D) or 2.0-2.12 lb/A (7-8% D) (7% WP/D) OR MAI 0.31-1.4 lb/ 100 gal (3.7-7% WP/D) or 0.51-2.0 lb/A (3.4-5% D) (3.7-7% WP/D)	Foliar application. Apply before diseases appear. Repeat at 7 to 10 day intervals and after rains. For anthracnose on sycamore, apply at first budding. Repeat as full coverage spray 10 to 14 days later. For bacterial blight of lilac, apply in September and again before fall rains. For bacterial leaf spot on barberry, apply when leaves appear. Repeat 2 to 3 times 10 days apart. For black canker of willow, apply when new leaves are one-quarter inch long. Repeat in 2 weeks. For botrytis blight of peonies, Apply before shoots are 1 foot tall. Repeat in 2 weeks, and again if any signs of bud blast appear. For cedar-apple rust of cedar and juniper, apply in July-August. For leaf blister of elm and oak, apply before growth begins or as leaves uncurl. For leaf gall of azalea, apply to entire plant before buds
FBZAPDZ	Bacterial blight (Pseudomonas)		
FMCZPDZ	Bacterial leaf spot (Pseudomonas)		
FDAEPCH	Black canker (Physalospora)		
FMAEDBS	Black spot (Diplocarpon)		
FBAABAW	Botrytis blight		
FJAFGBI	Cedar-apple rust (Gymnosporangium)		
FBAACEL	Coryneum blight		
FDACPCN	Dieback (Phytophthora)		
FFABQBB	Downy mildew		
FBATQBB	Leaf blights		
FEAFTAB	Leaf blister (Taphrina)		
FCADQBB	Leaf blotch		
FEAHEBP	Leaf gall (Exobasidium)		
FGAKSBL	Leaf scorch (Septoria)		

EPA Index to Pesticide Chemicals

BASIC COPPER SULFATE

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
	Ornamental and/or Shade Trees cluster (continued)		
	Pest list continued from the previous page.		
FMBCQBB	Leaf spots		break in spring. Repeat 2 to 3 weeks later. OR MAI Formulated with one or a combination of: lindane (gamma isomer of benzene hexachloride); zineb; methylated napthalenes; carbaryl; piperonyl butoxide, technical; pyrethrins; rotenone (and other cube resins); or sulfur.
FDAAVAL	Nectria canker (Volutella)		
FBAVQBB	Needle cast		
FFACQBB	Powdery mildew		
FDAQLAS	Stem canker (Leptosphaeria)		
FBAEQBB	Twig blight		
FICUQBB	Wound rot and decay	2.12% metallic copper paste (53% WP)	Tree wound application. Mix with phenol. Apply paste with a spatula to previously cleaned wound area.
/35097AA /35097DA	Palm		
FAAACDP	Anthracnose (Colletotrichum)	2.12 lb/ 100 gal (12.5-53% WP)	Foliar application. Apply to wet above ground parts at first sign of disease. Repeat as needed.
FLAHGAY	False smut (Graphiola)		
FMBCQBB	Leaf spots		
FEAJQBB	Scab		
/31155AA /31155DA	Philodendron		
FMBCXAA	Bacterial leaf spot (Xanthomonas)	1.04 lb/ 100 gal (52% WP)	Foliar application. Tank mix with mancozeb. Apply when diseases appear. Repeat at 7 to 10 day intervals.
	(Lawns and Turf (including ground cover))		
/33010AA	Ornamental Lawns		
FMAXPCR	Gray leaf spot (Piricularia) (in FL)	1.06 lb/ 100 gal/A (46.25-53% WP) or 2.12 lb/ 100 gal (53% WP)	Foliar application. Apply before or at first sign of disease. Repeat at 10 to 14 day intervals as needed.

BASIC COPPER SULFATE

Site and Pest — Dosages and Formulation(s) — Tolerance, Use, Limitations

AERIAL AND TANK MIX APPLICATIONS

9001500 AAAAAAA — Aerial Application

—

Refer to
AGRICULTURAL CROPS
All sites except Filbert, Walnut

9900300 AAAAAAA — Tank Mix

—

Refer to
AGRICULTURAL CROPS
Celery, Curcurbits, Grapes, Onion, Peanuts, Tomato
ORNAMENTAL PLANTS
(Ornamental Plants (herbaceous plants and bulbs; woody shrubs, trees and vines)
Ornamental and/or Shade Trees, Philodendron

BASIC COPPER SULFATE

Listing of Registered Pesticide Products by Formulation

53% technical chemical

basic copper sulfate (008101)
035896-00004

2% dust

basic copper sulfate (008101), maneb (014505) plus sulfur (077501)
003743-00189

3% dust

basic copper sulfate (008101)
000802-00364

basic copper sulfate (008101) plus sulfur (077501)
009859-00094 009859-00095

basic copper sulfate (008101), carbaryl (056801) plus sulfur (077501)
009859-00096

3.4% dust

basic copper sulfate (008101) plus sulfur (077501)
005905-00322 006735-00163 009779-00023 009779-00106
009779-00121

basic copper sulfate (008101), carbaryl (056801) plus sulfur (077501)
001842-00199 001842-00207 001990-00463 006735-00164
006735-00166 009779-00060 009779-00062 009779-00112

3.5% dust

basic copper sulfate (008101) plus maneb (014505)
000595-00286

basic copper sulfate (008101), maneb (014505) plus parathion (057501)
000595-00257 000595-00291

basic copper sulfate (008101), maneb (014505) plus malathion (057701)
000595-00234

basic copper sulfate (008101), maneb (014505) plus 0,0-diethyl 0-(2-isopropyl-6-methyl-4-pyrimidinyl) phosphorothioate (057801)
000595-00277

3.8% dust

basic copper sulfate (008101)
005967-00107

BASIC COPPER SULFATE

Listing of Registered Pesticide Products by Formulation (continued)

4% dust

basic copper sulfate (008101)
000802-00492

basic copper sulfate (008101) plus sulfur (077501)
001191-00278 002124-00054 002460-00002 003342-00028
003743-00201 004139-00005 009859-00080

4.5% dust

basic copper sulfate (008101), maneb (014505) plus parathion (057501)
034704-00172

5% dust

basic copper sulfate (008101)
002124-00473 005967-00129

basic copper sulfate (008101) plus lindane (gamma isomer of benzene hexachloride) (009001)
002917-00054

basic copper sulfate (008101) plus methoxychlor, technical (034001)
000595-00317 002393-00243 034704-00137

basic copper sulfate (008101) plus rotenone (and other cube resins) (071003)
001159-00039 002393-00218

basic copper sulfate (008101), maneb (014505) plus sulfur (077501)
046946-00020

basic copper sulfate (008101), piperonyl butoxide, technical (067501), pyrethrins (069001), rotenone (and other cube resins) (071003) plus sulfur (077501)
000419-00092 000419-00103

6% dust

basic copper sulfate (008101)
000279-02722

basic copper sulfate (008101) plus carbaryl (056801)
000327-00127

basic copper sulfate (008101), carbaryl (056801) plus parathion (057501)
002124-00634

6.25% dust

basic copper sulfate (008101) plus carbaryl (056801)
003743-00333

Listing of Registered Pesticide Products by Formulation (continued)

6.3% dust

basic copper sulfate (008101)
000239-00129 000279-01266

6.7% dust

basic copper sulfate (008101)
005967-00120

7% dust

basic copper sulfate (008101)
000226-00032 000477-00054 000595-00221 000829-00006
001386-00492 002124-00580 002342-00856 003743-00188
003743-00334 008590-00051 034704-00133

basic copper sulfate (008101) plus calcium arsenate (013501)
000279-00825 000477-00073 000769-00149

basic copper sulfate (008101) plus methoxychlor, technical (034001)
008590-00166

basic copper sulfate (008101) plus carbaryl (056801)
000016-00127 000226-00243 002124-00572 034704-00192

basic copper sulfate (008101) plus parathion (057501)
000595-00241 000595-00294 008590-00172 008590-00187

basic copper sulfate (008101) plus malathion (057701)
000595-00229

basic copper sulfate (008101) plus rotenone (and other cube resins) (071003)
000904-00174 002342-00842 008590-00064

basic copper sulfate (008101) plus sulfur (077501)
000595-00204

basic copper sulfate (008101) plus endosulfan (079401)
002342-00849 002393-00249 034704-00144

basic copper sulfate (008101), maneb (014505) plus malathion (057701)
000595-00283

basic copper sulfate (008101), carbaryl (056801) plus rotenone (and other cube resins) (071003)
000869-00137

basic copper sulfate (008101), malathion (057701) plus sulfur (077501)
000595-00242

BASIC COPPER SULFATE

Listing of Registered Pesticide Products by Formulation (continued)

8% dust
basic copper sulfate (008101)
002935-00332

4% wettable powder
basic copper sulfate (008101) plus sulfur (077501)
001842-00226

5.2% wettable powder
basic copper sulfate (008101), lead arsenate (013502) plus sulfur (077501)
000635-00528

6.3% wettable powder
basic copper sulfate (008101) plus sulfur (077501)
009859-00129 009859-00130

7.1% wettable powder
basic copper sulfate (008101) plus sulfur (077501)
002124-00793

7.3% wettable powder
basic copper sulfate (008101) plus sulfur (077501)
002124-00790 002124-00795

7.4% wettable powder
basic copper sulfate (008101) plus sulfur (077501)
002124-00791

12.5% wettable powder
basic copper sulfate (008101)
002169-00047 005481-00135

12.75% wettable powder
basic copper sulfate (008101)
000904-00166 004931-00135 005887-00041 023486-00045
033955-00097

13.85% wettable powder
basic copper sulfate (008101)
000557-01874

14.3% wettable powder
basic copper sulfate (008101)
002124-00794

14.9% wettable powder
basic copper sulfate (008101)
000557-01877 002124-00788 002124-00789

Listing of Registered Pesticide Products by Formulation (continued)

15.2% wettable powder

basic copper sulfate (008101)
009859-00253

15.6% wettable powder

basic copper sulfate (008101)
000557-01871 002124-00792

17.05% wettable powder

basic copper sulfate (008101)
000557-01899

18.1% wettable powder

basic copper sulfate (008101)
000557-01900

19% wettable powder

basic copper sulfate (008101)
005967-00111

basic copper sulfate (008101) plus zinc sulfate, basic (089101)
001202-00307

20.1% wettable powder

basic copper sulfate (008101)
009859-00261

22% wettable powder

basic copper sulfate (008101)
001148-00006 009859-00155

30.25% wettable powder

basic copper sulfate (008101) plus captan (081301)
002124-00779

30.6% wettable powder

basic copper sulfate (008101)
009859-00156

33% wettable powder

basic copper sulfate (008101)
009859-00142

46.25% wettable powder

basic copper sulfate (008101)
000557-01933 009859-00125

50% wettable powder

basic copper sulfate (008101)
000802-00012 001109-00035 009859-00084 020004-00001

Listing of Registered Pesticide Products by Formulation (continued)

52% wettable powder

basic copper sulfate (008101)
001278-00001

53% wettable powder

basic copper sulfate (008101)
000226-00033 000239-00005 000279-00423 000279-00698
000456-00004 000476-00102 000477-00069 000557-01882
000557-01896 001109-00013 001109-00036 002124-00297
004833-00002 005905-00296 005967-00106 006720-00226
007001-00066 008901-00016 009782-00012 009859-00115
010103-00008 014775-00032 019713-00072 035896-00007
035896-00009 045115-00024

3.7% wettable powder/dust

basic copper sulfate (008101), lindane (gamma isomer of benzene hexachloride) (009001), zineb (014506), carbaryl (056801) plus sulfur (077501)
000728-00086

5% wettable powder/dust

basic copper sulfate (008101), piperonyl butoxide, technical (067501), pyrethrins (069001), rotenone (and other cube resins) (071003) plus sulfur (077501)
000004-00107

7% wettable powder/dust

basic copper sulfate (008101)
000004-00058 001772-00067

basic copper sulfate (008101) plus carbaryl (056801)
001767-00075 002006-00057

basic copper sulfate (008101) plus rotenone (and other cube resins) (071003)
000004-00053 000572-00058

basic copper sulfate (008101) plus sulfur (077501)
000557-01940

basic copper sulfate (008101), methylated napthalenes (054002) plus rotenone (and other cube resins) (071003)
000004-00030

basic copper sulfate (008101), methylated napthalenes (054002), carbaryl (056801) plus rotenone (and other cube resins) (071003)
000004-00029

0.11 lb/gal flowable concentrate

basic copper sulfate (008101) plus sulfur (077501)
009859-00097

BASIC COPPER SULFATE

Listing of Registered Pesticide Products by Formulation (continued)

0.39 lb/gal or 4.15% flowable concentrate
  basic copper sulfate (008101)
    000682-00067

0.48 lb/gal or 4.4% flowable concentrate
  basic copper sulfate (008101)
    022555-00003

0.53 lb/gal flowable concentrate
  basic copper sulfate (008101) plus sulfur (077501)
    009859-00085

1 lb/gal flowable concentrate
  basic copper sulfate (008101)
    035896-00014

3 lb/gal flowable concentrate
  basic copper sulfate (008101)
    001812-00241 044283-00001

4.24 lb/gal flowable concentrate
  basic copper sulfate (008101)
    001109-00034 003238-00080 009859-00119 022555-00004

Listing of Registered Pesticide Products by Formulation (continued)

State Label Registrations

AL Reg. No.
022555-06356

AZ Reg. No.
022555-06375

CA Reg. No.
000239-04231 000239-04234 005967-05184 007001-07752
010972-07149 022555-06299

CO Reg. No.
022555-06365

FL Reg. No.
002342-06958 022555-06364 033914-08109

GA Reg. No.
022555-06363

ID Reg. No.
022555-06301

IL Reg. No.
022555-06367

KS Reg. No.
022555-06362 022555-06387

LA Reg. No.
022555-06361

MI Reg. No.
022555-06354

MN Reg. No.
022555-06360 022555-06386

MT Reg. No.
022555-06300

NB Reg. No.
022555-06359 022555-06388

NV Reg. No.
022555-06377

OK Reg. No.
022555-06358

BASIC COPPER SULFATE

Listing of Registered Pesticide Products by Formulation (continued)

State Label Registrations (continued)

OR Reg. No.
022555-06376

SC Reg. No.
022555-06355

TX Reg. No.
022555-06357 022555-06373

UT Reg. No.
022555-06370

WA Reg. No.
022555-06369

WI Reg. No.
022555-06366

BASIC COPPER SULFATE

Appendix A

Listing of Common Chemical Names Used on the Entry

Chemical Code	Common Name (source)	EPA Acceptable Common/Chemical Name
014504	mancozeb	zinc ion and manganese ethylene bisdithiocarbamate 80%, a coordination product of manganese 16%, zinc 2%, ethylene bisdithiocarbamate 62%

BASIC COPPER SULFATE

Appendix B

Listing of Registration Numbers By Site

AGRICULTURAL CROPS

/23001AA **Alfalfa**
001278-00001

/03001AA **Almonds**
000004-00058 000239-00005 000279-00698 000476-00102
000557-01896 001109-00013 001109-00034 001109-00036
001148-00006 001202-00307 001278-00001 001812-00241
004833-00002 005967-00106 005967-00107 005967-00111
006720-00226 007001-00066 008901-00016 009859-00119
010103-00008 019713-00072 022555-00003 022555-00004
035896-00007 044283-00001 045115-00024

/04001AA **Apple**
000004-00058 000239-00005 000279-00698 000279-02722
000456-00004 000635-00528 000802-00012 000904-00166
001148-00006 001202-00307 001278-00001 002169-00047
004833-00002 004931-00135 005481-00135 005887-00041
005967-00107 005967-00111 005967-00120 008901-00016
023486-00045 033955-00097 035896-00007

/05001AA **Apricot**
000004-00058 000239-00005 000279-00698 000476-00102
000557-01896 000682-00067 000802-00012 001109-00013
001109-00034 001109-00036 001148-00006 001202-00307
001278-00001 001812-00241 002124-00297 004833-00002
005481-00135 005967-00106 005967-00107 005967-00111
006720-00226 007001-00066 008901-00016 009859-00119
010103-00008 019713-00072 022555-00003 022555-00004
033955-00097 035896-00007 044283-00001 045115-00024

/28000AA **Avocado**
000557-01882 000557-01896 001109-00013 001109-00034
001109-00035 001109-00036 001278-00001 001812-00241
006720-00226 008901-00016 009782-00012 019713-00072
022555-00004 035896-00007 044283-00001 045115-00024

/06002AA **Banana**
001278-00001

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BASIC COPPER SULFATE

Appendix B

Listing of Registration Numbers By Site (continued)

/28063AA **Barley**
001278-00001

/28001AA **Beans**
000004-00029 000004-00030 000004-00107 000226-00032
000226-00033 000226-00243 000419-00092 000419-00103
000476-00102 000557-01896 000572-00058 000595-00229
000595-00277 000595-00283 000869-00137 000904-00174
001109-00013 001109-00034 001109-00035 001109-00036
001159-00039 001278-00001 001812-00241 001990-00463
002124-00297 002393-00218 002935-00332 003743-00189
003743-00333 004931-00135 006720-00226 006735-00163
006735-00166 008590-00064 008901-00016 009782-00012
010103-00008 019713-00072 022555-00003 022555-00004
035896-00007 044283-00001 045115-00024 046946-00020

/28002AA **Beets**
000476-00102 000557-01896 000595-00204 000595-00221
000595-00229 000595-00317 001109-00013 001109-00036
001278-00001 001386-00492 001812-00241 002935-00332
006720-00226 008901-00016 010103-00008 019713-00072
022555-00003 022555-00004 035896-00007 044283-00001
045115-00024

/01002AA **Blackberry**
000279-00698 000802-00012 001109-00013 001109-00034
001109-00036 001278-00001 001812-00241 004833-00002
008901-00016 019713-00072 022555-00004 023486-00045
035896-00007 044283-00001 045115-00024

/01002AA **Boysenberry**
000279-00698 001109-00013 001109-00034 001109-00036
001278-00001 001812-00241 004833-00002 008901-00016
019713-00072 022555-00004 023486-00045 035896-00007
044283-00001 045115-00024

/13005AA **Broccoli**
000004-00058 000016-00127 000226-00033 000226-00243
000239-00129 000279-01266 000476-00102 000557-01896
000572-00058 000595-00229 000595-00277 000595-00317
001109-00013 001109-00036 001159-00039 001278-00001
001812-00241 001990-00463 002935-00332 005967-00111
006720-00226 006735-00166 008590-00064 008901-00016
010103-00008 019713-00072 022555-00003 022555-00004
035896-00007 044283-00001 045115-00024

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BASIC COPPER SULFATE

Appendix B

Listing of Registration Numbers By Site (continued)

/13006AA Brussels Sprouts

000004-00058 000016-00127 000239-00129 000279-01266
000557-01896 005967-00111 006720-00226 006735-00166
008590-00064 008901-00016 010103-00008 035896-00007

/13007AA Cabbage

000004-00058 000016-00127 000226-00033 000226-00243
000239-00129 000279-01266 000476-00102 000557-01896
000572-00058 000595-00229 000595-00277 000595-00317
001109-00013 001109-00036 001159-00039 001278-00001
001812-00241 001990-00463 002393-00218 002935-00332
005967-00111 006720-00226 006735-00166 008590-00064
008901-00016 010103-00008 019713-00072 022555-00003
022555-00004 035896-00007 044283-00001 045115-00024

/28073AA Carrots

000004-00058 000239-00005 000476-00102 000477-00054
000477-00069 000557-01896 000595-00204 000595-00221
000595-00229 000595-00234 000595-00242 000595-00257
000595-00283 000595-00286 000595-00291 000595-00294
000595-00317 001109-00013 001109-00034 001109-00036
001278-00001 001812-00241 002935-00332 005905-00296
008901-00016 009782-00012 010103-00008 019713-00072
022555-00003 022555-00004 035896-00007 044283-00001
045115-00024 046946-00020

/13008AA Cauliflower

000004-00058 000016-00127 000226-00033 000226-00243
000239-00129 000279-01266 000476-00102 000557-01896
000572-00058 000595-00229 000595-00277 000595-00317
001109-00013 001109-00036 001159-00039 001278-00001
001812-00241 001990-00463 002935-00332 005967-00111
006720-00226 006735-00166 008590-00064 008901-00016
010103-00008 019713-00072 022555-00003 022555-00004
035896-00007 044283-00001 045115-00024

/28003AA Celery

000004-00030 000016-00127 000239-00005 000239-00129
000279-00423 000279-01266 000419-00092 000476-00102
000477-00054 000477-00069 000477-00073 000557-01896
000572-00058 000595-00204 000595-00221 000595-00234
000595-00241 000595-00242 000595-00257 000595-00283
000595-00286 000595-00291 000595-00294 000802-00012
000904-00166 000904-00174 001109-00013 001109-00034
001109-00035 001109-00036 001202-00307 001278-00001
001812-00241 002169-00047 002342-00856 002393-00218
002935-00332 003238-00080 005481-00135 005887-00041
005905-00296 005967-00107 005967-00111 005967-00120
006720-00226 008590-00051 008590-00064 008901-00016

Listing of Registration Numbers By Site (continued)

Celery (continued)

009782-00012   009859-00084   009859-00115   009859-00119
009859-00125   009859-00142   010103-00008   014775-00032
019713-00072   020004-00001   022555-00004   023486-00045
034704-00133   034704-00172   035896-00007   035896-00009
035896-00014   044283-00001   045115-00024   046946-00020

/05002AA Cherry (sour)

000004-00058   000239-00005   000279-00698   000476-00102
000477-00069   000557-01896   000682-00067   001109-00013
001109-00034   001109-00036   001148-00006   001202-00307
001278-00001   001812-00241   002124-00297   002169-00047
004833-00002   004931-00135   005481-00135   005887-00041
006720-00226   007001-00066   008901-00016   009859-00119
010103-00008   019713-00072   022555-00004   023486-00045
033955-00097   035896-00007   044283-00001   045115-00024

/02000AA Citrus Fruits

000239-00005   000476-00102   000477-00069   000557-01871
000557-01874   000557-01877   000557-01882   000557-01896
000557-01899   000557-01900   000557-01933   000557-01940
001109-00013   001109-00034   001109-00035   001109-00036
001148-00006   001202-00307   001278-00001   001812-00241
002124-00297   002124-00788   002124-00789   002124-00790
002124-00791   002124-00792   002124-00793   002124-00794
002124-00795   003238-00080   004833-00002   005481-00135
005967-00106   005967-00111   006720-00226   008901-00016
009782-00012   009859-00084   009859-00115   009859-00119
009859-00125   009859-00129   009859-00130   009859-00155
009859-00156   009859-00253   009859-00261   010103-00008
014775-00032   019713-00072   020004-00001   022555-00003
022555-00004   033955-00097   035896-00007   035896-00009
035896-00014   044283-00001   045115-00024

/01010AA Cranberry

001278-00001

/10000AA Cucurbits (cucumbers, melons, pumpkin, squash)

000004-00030   000004-00053   000004-00058   000004-00107
000016-00127   000226-00032   000226-00033   000226-00243
000239-00005   000239-00129   000279-00423   000456-00004
000476-00102   000477-00054   000477-00069   000477-00073
000557-01896   000572-00058   000595-00204   000595-00221
000595-00229   000595-00234   000595-00241   000595-00257
000595-00277   000595-00283   000595-00286   000595-00291
000595-00294   000595-00317   000829-00006   000869-00137
000904-00174   001109-00013   001109-00034   001109-00035

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Listing of Registration Numbers By Site (continued)

Cucurbits (cucumbers, melons, pumpkin, squash) (continued)

001109-00036 001159-00039 001278-00001 001812-00241
002124-00473 002169-00047 002342-00842 002342-00849
002342-00856 002393-00218 002917-00054 002935-00332
003238-00080 003743-00188 003743-00334 004931-00135
005887-00041 005905-00296 006720-00226 007001-00066
008590-00051 008590-00064 008901-00016 009782-00012
009859-00084 009859-00115 009859-00119 009859-00125
010103-00008 014775-00032 019713-00072 020004-00001
022555-00003 022555-00004 023486-00045 034704-00137
034704-00192 035896-00007 035896-00009 044283-00001
045115-00024

/01011AA Currant
000802-00012 001278-00001 004931-00135 005887-00041
008901-00016 023486-00045 035896-00007

/01004AA Dewberry
001109-00013 001109-00034 001109-00036 001278-00001
001812-00241 008901-00016 019713-00072 022555-00004
023486-00045 035896-00007 044283-00001 045115-00024

/11001AA Eggplant
000004-00030 000419-00092 000476-00102 000557-01896
000572-00058 000595-00204 000595-00221 000595-00229
000595-00234 000595-00242 000595-00286 000595-00317
000869-00137 000904-00174 001109-00013 001109-00036
001159-00039 001278-00001 001386-00492 001812-00241
001990-00463 002935-00332 006720-00226 008901-00016
009782-00012 010103-00008 019713-00072 022555-00003
022555-00004 035896-00007 044283-00001 045115-00024
046946-00020

/03005AA Filbert
001109-00034 001109-00035 001278-00001

/01013AA Gooseberry
000802-00012 001278-00001 004931-00135 005887-00041
008901-00016 023486-00045 035896-00007

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Appendix B

Listing of Registration Numbers By Site (continued)

/01014AA **Grapes**

000016-00127 000226-00033 000239-00005 000279-00423
000279-02722 000456-00004 000477-00054 000477-00069
000557-01896 000572-00058 000595-00204 000595-00221
000595-00286 000904-00166 000904-00174 001109-00013
001109-00034 001109-00036 001278-00001 001767-00075
001812-00241 002169-00047 004931-00135 005481-00135
005887-00041 006720-00226 008590-00166 008590-00172
008901-00016 010103-00008 019713-00072 022555-00004
023486-00045 033955-00097 035896-00007 035896-00014
044283-00001 045115-00024

/08020AA **Hops**

001278-00001 001812-00241 002935-00332 022555-00003

/13020AA **Lettuce**

000016-00127 000239-00129 001278-00001 005967-00107
005967-00111 008901-00016 035896-00007

/01005AA **Loganberry**

000279-00698 001109-00013 001109-00034 001109-00036
001278-00001 001812-00241 004833-00002 008901-00016
019713-00072 022555-00004 023486-00045 035896-00007
044283-00001 045115-00024

/06007AA **Mango**

000557-01882 000557-01896 001109-00034 001109-00035
001278-00001

/05003AA **Nectarine**

000239-00005 000279-00698 000476-00102 000557-01896
000682-00067 001109-00013 001109-00034 001109-00036
001148-00006 001278-00001 001812-00241 001990-00463
002124-00297 003238-00080 004833-00002 005887-00041
005967-00106 005967-00111 006720-00226 008901-00016
009859-00119 010103-00008 019713-00072 022555-00004
035896-00007 044283-00001 045115-00024

/28014AA **Olive**

000279-00698 001109-00013 001109-00034 001109-00036
001148-00006 001278-00001 001812-00241 004833-00002
008901-00016 019713-00072 022555-00004 035896-00007
044283-00001 045115-00024

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Appendix B

Listing of Registration Numbers By Site (continued)

/14011AA **Onion**

000239-00129 000279-01266 000595-00204 000595-00221
000595-00229 000595-00234 000595-00257 000595-00277
000595-00283 000595-00286 000595-00291 000595-00294
001109-00013 001109-00034 001109-00036 001278-00001
001812-00241 005967-00107 005967-00111 007001-00066
019713-00072 022555-00004 034704-00172 035896-00007
044283-00001 045115-00024 046946-00020

/06010AA **Papaya**

006720-00226 008901-00016

/05004AA **Peach**

000239-00005 000279-00698 000476-00102 000557-01896
000682-00067 000802-00012 000904-00166 001109-00013
001109-00034 001109-00035 001109-00036 001148-00006
001202-00307 001278-00001 001812-00241 001990-00463
002124-00297 002169-00047 003238-00080 004833-00002
005481-00135 005887-00041 005967-00106 005967-00111
006720-00226 008901-00016 009859-00119 010103-00008
019713-00072 022555-00004 033955-00097 035896-00007
044283-00001 045115-00024

/28015AA **Peanuts**

000557-01896 001109-00013 001109-00034 001109-00036
001191-00278 001278-00001 001772-00067 001812-00241
001842-00199 001842-00207 001842-00226 002124-00054
002460-00002 003342-00028 003743-00201 004139-00005
005905-00322 006720-00226 006735-00163 006735-00164
006735-00166 008901-00016 009779-00023 009779-00060
009779-00062 009779-00106 009779-00112 009779-00121
009782-00012 009859-00080 009859-00085 009859-00094
009859-00095 009859-00096 009859-00097 010103-00008
019713-00072 022555-00003 022555-00004 035896-00007
035896-00009 035896-00014 044283-00001 045115-00024

/04003AA **Pear**

000004-00058 000239-00005 000239-00129 000279-00698
000279-02722 000476-00102 000557-01896 000802-00012
000802-00364 000802-00492 001109-00013 001109-00034
001109-00035 001109-00036 001148-00006 001202-00307
001278-00001 001812-00241 002124-00297 002169-00047
003342-00028 004833-00002 005481-00135 005967-00106
005967-00107 005967-00111 005967-00120 005967-00129
006720-00226 008901-00016 009859-00119 010103-00008
019713-00072 022555-00003 022555-00004 033955-00097
035896-00007 044283-00001 045115-00024

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Appendix B

Listing of Registration Numbers By Site (continued)

/28016AA **Peas**

000869-00137 001278-00001 035896-00007

/03008AA **Pecan**

005481-00135 008901-00016 033955-00097 035896-00007

/28017AA **Peppers**

000016-00127 000226-00243 000476-00102 000557-01896
000595-00204 000595-00221 000595-00229 000595-00234
000595-00242 000595-00283 000595-00286 000595-00317
000829-00006 000869-00137 001109-00013 001109-00034
001109-00035 001109-00036 001278-00001 001386-00492
001812-00241 001990-00463 002124-00779 002342-00849
002935-00332 003238-00080 003743-00334 006720-00226
006735-00166 008901-00016 009782-00012 009859-00084
009859-00115 009859-00119 009859-00142 010103-00008
014775-00032 019713-00072 020004-00001 022555-00003
022555-00004 034704-00192 035896-00007 035896-00009
035896-00014 044283-00001 045115-00024 046946-00020

/05005AA **Plum**

000239-00005 000279-00698 000476-00102 000557-01896
001109-00013 001109-00034 001109-00036 001202-00307
001278-00001 001812-00241 002169-00047 004833-00002
005481-00135 006720-00226 007001-00066 008901-00016
009859-00119 010103-00008 019713-00072 022555-00004
033955-00097 035896-00007 044283-00001 045115-00024

/14013AA **Potato**

000004-00029 000004-00030 000016-00127 000226-00032
000226-00033 000226-00243 000239-00005 000239-00129
000279-00423 000279-01266 000419-00092 000456-00004
000476-00102 000477-00054 000477-00069 000557-01896
000557-01933 000572-00058 000595-00204 000595-00221
000595-00229 000595-00234 000595-00241 000595-00257
000595-00277 000595-00283 000595-00286 000595-00294
000595-00317 000769-00149 000802-00012 000829-00006
000904-00174 001109-00013 001109-00034 001278-00001
001386-00492 001767-00075 001812-00241 001990-00463
002006-00057 002124-00297 002124-00580 002169-00047
002342-00842 002342-00849 002342-00856 002393-00218
002393-00243 002393-00249 002935-00332 003238-00080
003743-00188 003743-00333 003743-00334 004931-00135
005887-00041 005905-00296 005967-00111 006720-00226
008590-00051 008590-00064 008590-00187 008901-00016
009782-00012 009859-00084 009859-00115 009859-00119
009859-00125 009859-00142 014775-00032 019713-00072
020004-00001 022555-00003 022555-00004 023486-00045

EPA Index to Pesticide Chemicals

BASIC COPPER SULFATE

Appendix B

Listing of Registration Numbers By Site (continued)

Potato (continued)

033955-00097 034704-00133 034704-00144 034704-00172
034704-00192 035896-00007 035896-00009 044283-00001
045115-00024 046946-00020

/05006AA Prune
000239-00005 000279-00698 000476-00102 000557-01896
001109-00013 001109-00034 001109-00036 001278-00001
001812-00241 004833-00002 006720-00226 007001-00066
008901-00016 009859-00119 010103-00008 019713-00072
022555-00004 035896-00007 044283-00001 045115-00024

/01006AA Raspberry
000279-00698 001109-00013 001109-00034 001109-00036
001278-00001 001812-00241 004833-00002 008901-00016
019713-00072 022555-00004 023486-00045 035896-00007
044283-00001 045115-00024

/28072AA Rice
022555-00003

/28023AA Soybeans
022555-00003

/13024AA Spinach
000016-00127 000239-00129 000476-00102 000557-01896
000595-00204 001109-00013 001109-00034 001109-00036
001278-00001 001812-00241 002935-00332 006720-00226
008901-00016 010103-00008 019713-00072 022555-00003
022555-00004 035896-00007 044283-00001 045115-00024
046946-00020

/01016AA Strawberry
000004-00058 000016-00127 000239-00005 000239-00129
000476-00102 000557-01896 000572-00058 000904-00166
000904-00174 001109-00013 001109-00036 001278-00001
001812-00241 001990-00463 002124-00297 005481-00135
005967-00111 006720-00226 008901-00016 009782-00012
010103-00008 014775-00032 019713-00072 022555-00004
033955-00097 035896-00007 044283-00001 045115-00024

/28020AA Sugar Beets
000239-00005 000239-00129 000477-00069 000557-01896
001109-00013 001109-00034 001109-00035 001109-00036
001278-00001 001812-00241 002124-00297 006720-00226
008901-00016 010103-00008 019713-00072 022555-00003
022555-00004 034704-00133 035896-00007 035896-00009
044283-00001 045115-00024

EPA Index to Pesticide Chemicals

BASIC COPPER SULFATE

Appendix B

Listing of Registration Numbers By Site (continued)

/26003DA Tobacco

000226-00033 006720-00226 010103-00008 035896-00007

/11005AA Tomato

000004-00029 000004-00030 000004-00058 000004-00107
000016-00127 000226-00032 000226-00033 000226-00243
000239-00005 000239-00129 000279-00423 000279-00825
000279-01266 000327-00127 000419-00092 000419-00103
000456-00004 000476-00102 000477-00054 000477-00069
000477-00073 000557-01896 000557-01933 000572-00058
000595-00204 000595-00221 000595-00229 000595-00242
000595-00277 000595-00283 000595-00286 000595-00317
000769-00149 000802-00012 000829-00006 000869-00137
000904-00166 000904-00174 001109-00013 001109-00034
001109-00035 001109-00036 001278-00001 001386-00492
001767-00075 001772-00067 001812-00241 001990-00463
002006-00057 002124-00297 002124-00572 002124-00580
002124-00634 002124-00779 002169-00047 002342-00842
002342-00856 002393-00218 002393-00249 002935-00332
003238-00080 003743-00188 003743-00333 003743-00334
004931-00135 005481-00135 005887-00041 005905-00296
005967-00111 005967-00120 006720-00226 006735-00166
008590-00051 008590-00064 008901-00016 009782-00012
009859-00084 009859-00115 009859-00119 009859-00125
009859-00142 014775-00032 019713-00072 020004-00001
022555-00003 022555-00004 023486-00045 033955-00097
034704-00133 034704-00144 034704-00192 035896-00007
035896-00009 035896-00014 044283-00001 045115-00024
046946-00020

/28024DA Vegetables (seedlings)

035896-00007

/03009AA Walnut

000239-00005 000239-00129 000476-00102 000557-01896
000802-00012 001109-00013 001109-00034 001109-00035
001109-00036 001148-00006 001278-00001 001812-00241
005967-00106 005967-00129 006720-00226 008901-00016
009859-00115 010103-00008 019713-00072 022555-00004
035896-00007 044283-00001 045115-00024

/28065AA Wheat

001278-00001 022555-00003

(Agricultural Seed Treatment)

/28007AA Cotton (seed)

022555-00003

Listing of Registration Numbers By Site (continued)

/28072AA **Rice (water planted rice seed)**
001109-00034 001109-00035

/28023AA **Soybeans (seed)**
022555-00003

/28065AA **Wheat (seed)**
000239-00005 00476-00102 035896-00007

ORNAMENTALS

(Ornamental Plants (herbaceous plants and bulbs; woody shrubs, trees and vines))

/35021AA
/35021DA **Arborvitae**

000004-00058 000802-00012 000904-00166 005481-00135
006720-00226 033955-00097 035896-00007

/31026AA
/31026DA **Aster**

000004-00058 006720-00226 035896-00007

/35000AA
/35000DA **Ornamental and/or Shade Trees**
(including Arborvitae, Cedar, Cypress, Dogwood, Elm, Juniper, Linden, Maple, Oak, Pine, Spruce, Sycamore, Tuliptree, Willow, and Yew)
000004-00058 000904-00166 001278-00001 004931-00135
005481-00135 005887-00041 006720-00226 033955-00097
035896-00007

/31003AA
/31003DA **Ornamental Flowering Plants**
(including Aster, Begonia, Carnation, Chrysanthemums, Dalhias, Delphinium, Geranium, Gladiolus, Hollyhock, Iris, Lilies, Marigolds, Nasturtium, Pansies, Peonies, Phlox, Snapdragon, Stocks, Sweet Pea, Tulips, Violets, and Zinnia)
000004-00058 000004-00107 000802-00012 000904-00166
002169-00047 002935-00332 005481-00135 006720-00226
010103-00008 033955-00097 035896-00007

Appendix B

Listing of Registration Numbers By Site (continued)

/34000AA
/34000DA

Ornamental Woody Shrubs and Vines (including Azalea, Barberry, Boxwood, Camellia, Gardenia, Hawthorn, Ivy, Laurel, Lilac, Rhododendron hybrids/cultivars, Rose, and Virginia Creeper)

000004-00030 000004-00058 000016-00127 000419-00092
000419-00103 000557-01882 000728-00086 000802-00012
000904-00166 002169-00047 002935-00332 005481-00135
006720-00226 006735-00163 010103-00008 033955-00097
035896-00007

/35097AA
/35097DA

Palm

005481-00135 006720-00226 033955-00097 035896-00007

/31155AA
/31155DA

Philodendron

001278-00001

(Lawns and Turf (including ground cover))

/33010AA

Ornamental Lawns

000557-01882 000557-01933 006720-00226 035896-000007

BASIC COPPER SULFATE

000004-00029
000004-00030
000004-00053
000004-00058
000004-00107
000016-00127
000226-00032
000226-00033
000226-00243
000239-00005
000239-00123
000279-00423
000279-00698
000279-00825
000279-01266
000279-02722
000327-00127
000419-00092
000419-00103
000456-00004
000476-00102
000477-00054
000477-00069
000477-00073
000557-01871
000557-01874
000557-01877
000557-01882
000557-01896
000557-01899
000557-01900
000557-01933
000557-01940
000572-00058
000595-00204
000595-00221
000595-00229
000595-00234
000595-00241
000595-00242
000595-00257
000595-00277
000595-00283
000595-00286
000595-00291
000595-00294
000595-00317
000604-00024
000635-00528
000682-00067
000728-00086
000769-00149
000802-00012
000802-00364
000802-00492
000829-00006
000869-00137
000904-00166
000904-00174
000962-00342
001109-00013
001109-00034
001109-00035
001109-00036
001148-00006
001159-00039
001191-00278
001202-00307
001278-00001
001386-00492
001767-00075
001772-00067
001812-00241
001842-00199
001842-00207
001842-00226
001990-00463
002006-00057
002124-00054
002124-00297
002124-00473
002124-00572
002124-00580
002124-00634
002124-00779
002124-00788
002124-00789
002124-00790
002124-00791
002124-00792
002124-00793
002124-00794
002124-00795
002169-00047
002342-00842
002342-00849
002342-00856
002393-00218
002393-00243
002393-00249
002460-00002
002917-00054
002935-00332
003238-00080
003342-00028
003743-00188
003743-00189
003743-00201
003743-00333
003743-00334
004139-00005
004185-00090
004185-00271
004833-00002
004931-00135
005481-00135
005887-00041
005905-00296
005905-00322
005967-00106
005967-00107
005967-00111
005967-00120
005967-00129
006720-00226
006735-00163
006735-00164
006735-00166
007001-00066
008590-00051
008590-00064
008590-00166
008590-00172
008590-00187
008901-00016
009779-00023
009779-00060
009779-00062
009779-00106
009779-00112
009779-00121
009782-00012
009859-00080
009859-00084
009859-00085
009859-00094
009859-00095
009859-00096
009859-00097
009859-00115
009859-00119
009859-00125
009859-00129
009859-00130
009859-00142
009859-00155
009859-00156
009859-00253
009859-00261
010103-00008
014775-00032
019713-00072
020004-00001
022555-00003
022555-00004
023486-00045
033955-00097
034704-00133
034704-00137
034704-00144
034704-00172
034704-00192
035896-00004
035896-00007
035896-00009
035896-00014
044283-00001
045115-00024
046946-00020

FINAL
SAI/SAI
h024402

EPA Index to Pesticide Chemicals

COPPER SULFATE MONOHYDRATE

TYPE PESTICIDE: Algaecide

FORMULATIONS:
G (11%)
SC/S (27.7%)

GENERAL WARNINGS AND LIMITATIONS: An algaecide registered for use in swimming pools and cooling towers. This product is toxic to fish; treated effluent should not be discharged where it will drain into lakes, streams, ponds, or public waters. Concentrations and dosages have been calculated for metallic copper (Cu), with the associated formulations indicated in percent copper sulfate monohydrate. A metallic content of 35.8 percent of the active ingredient was inferred for the purpose of calculating the dosages. Refer to the formulations page for percentages of metallic copper and copper sulfate monohydrate.

TIME REQUIRED FOR CONTROL: Not located.

PHYTOTOXICITY TO TARGET WEEDS: Not located.

PHYTOTOXICITY TO CROPS: Not located.

MODE OF ACTION: The absorbed copper causes an imbalance with other metal cofactors resulting in enzyme blockage and eventual death of the algae.

AQUATIC WEEDS CONTROLLED:

PKAAAAA	algae

	Site, Dosage and Formulation	Tolerance, Use, Limitations
	AQUATIC AREAS	
	(Industrial)	
/65019MA	Commercial and Industrial Water Cooling Tower Systems	
	3.94-4.93 ppm Cu (11% G)	Water treatment for algae control. Repeat as needed.
	(Ornamental and Recreational)	
/65011MA	Swimming Pool Water	
	0.25 lb Cu/ 10,000 gal [3 ppm Cu] (27.7% SC/S)	Water treatment for algae control. Initial application. One application will last an entire season.

COPPER SULFATE MONOHYDRATE

Listing of Registered Pesticide Products by Formulation

11% (metallic Cu: 3.94%) granular
  copper sulfate monohydrate (024402)
    005427-00005*
      *metallic copper inferred

27.7% (metallic Cu: 9.92%) soluble concentrate/solid
  copper sulfate monohydrate (024402)
    005605-00077*
      *metallic copper inferred

EPA Index to Pesticide Chemicals

COPPER SULFATE MONOHYDRATE

Appendix B

Listing of Registration Numbers By Site

AQUATIC AREAS

(Industrial)

/65019MA Commercial and Industrial Water Cooling Tower Systems
005427-00005

(Ornamental and Recreational)

/65011MA Swimming Pool Water
005605-00077

FINAL
SAI/MAI
024402

EPA Index to Pesticide Chemicals

COPPER SULFATE MONOHYDRATE

TYPE PESTICIDE: Fungicide

FORMULATIONS:
D (10%, 20%)
SC/S (29.4%)

GENERAL WARNINGS AND LIMITATIONS: Dusts contain 10 to 20 percent copper sulfate monohydrate with 3.5 to 7.16 percent metallic copper, respectively. Dosage rates are given in pounds metallic copper with the associated formulations in percent copper sulfate monohydrate. Refer to the formulation pages for the percent metallic copper and percent copper sulfate monohydrate for each registration. Dusts may be applied by ground equipment or aircraft. Dust throughly, keeping plants covered during periods of infection, and only when foliage is moist.
Definition of terms:
M.A.I. - Multiple active ingredient

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
04001AA	Apple		Exempt No preharvest interval through 1.75 pounds per acre.
BANEBI	Fire blight (Erwinia)	1.4-1.75 lb/A (10% D)	Foliar application. Apply ahead of any periods of high humidity. The number of applications is determined by length of bloom period.
13005AA 13007AA 13008AA	Broccoli Cabbage Cauliflower		Exempt No preharvest interval through 2.86 pounds per acre.
FABPAU MBCQBB	Downy mildew (Peronospora) Leaf spot	0.72-2.86 lb/A (10-20% D)	Foliar application. Apply before disease appears. Repeat at 7 to 10 day intervals.
	Cabbage	See Broccoli cluster.	

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
/28073AA	**Carrots**		Exempt No preharvest interval through 2.86 pounds per acre.
FBAACBM FBASAAX	Early blight (Cercospora) Late blight (Alternaria)	0.72-2.86 lb/A (10-20% D) OR MAI 1.79-2.15 lb/A (20% D)	Foliar application. Apply at first sign of disease. Repeat at 7 to 10 day intervals as needed. OR MAI Formulated with sulfur.
	Cauliflower	See Broccoli cluster.	
/28003AA	**Celery**		Exempt No preharvest interval through 2.86 pounds per acre.
FBAAPDZ FBAMCBM FBASSBL	Bacterial blight (Pseudomonas) Early blight (Cercospora) Late blight (Septoria)	0.72-2.86 lb/A (10-20% D) OR MAI 2.1-2.45 lb/A (20% D)	Foliar application. Apply at weekly intervals in the plant bed and repeat at 7 to 10 day intervals in the field beginning when plants are established. OR MAI Formulated with sulfur.
/02000AA	**Citrus Fruits**		Exempt Apply through 3.3 pounds per acre in central CA, or 0.26 to 0.47 pounds per 100 gallons in southern CA in accordance with directions below.
GAJPCN MCBSBL	Brown rot (Phytophthora) Leaf and fruit spot (Septoria)	0.47 lb/ 100 gal [500-700 gal/A] (29.4% SC/S)	Use limited to central CA. Foliar application. Add 6 pounds of hydrated lime. Apply in fall prior to wet season.

COPPER SULFATE MONOHYDRATE

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
	Citrus Fruits (continued)		
GAJPCN	Brown rot (Phytophthora)	0.26-0.47 lb/ 100 gal (29.4% SC/S)	Use limited to southern CA. Foliar and soil application. Apply 0.26 pound (add 4 pounds of hydrated lime) as a skirt spray on soil, trunk, and lower 3 to 4 feet of foliage. Apply in fall just prior to wet season. In coastal areas or other areas where no copper injury has been found, apply 0.47 pound (add 6 pounds of hydrated lime) as a full coverage spray. Apply in fall just prior to wet season.
05004AA	Peach		Exempt No preharvest interval through 3.5 pounds per acre. Formulated with sulfur.
BADMCB EAGTAB BAZCEL	Brown rot blossom and twig blight (Monilinia) Leaf curl (Taphrina) Shothole (Coryneum blight)	2.8-3.5 lb/A (20% D)	Dormant, delayed dormant, and foliar application. For brown rot, apply during prebloom and petal fall period. For leaf curl, apply in late fall and in the spring prior to bud swell. For shothole, apply in late fall and pink bud stage.
04003AA	Pear		Exempt No preharvest interval through 3.5 pounds per acre. Do not apply to Anjou or Comice varieties.
BANEBI EAJVAG	Fire blight (Erwinia) Scab (Venturia)	0.465-2.51 lb/A (10-20% D) OR MAI 2.8-3.5 lb/A (20% D)	Foliar application. Apply at 10 percent bloom and repeat at 5 to 7 day intervals or before any rainy or wet weather. The number of applications is determined by length of the bloom period. OR MAI Formulated with sulfur.

COPPER SULFATE MONOHYDRATE

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
/28017AA /11004AA	Pepper Pimento		Exempt No preharvest interval through 2.86 pounds per acre for pepper, or 1.79 pounds per acre for pimento.
FAAACDP	Anthracnose (Colletotrichum)	0.72-2.86 lb/A (10-20% D)	Foliar application. Apply at first sign of disease. Repeat at 7 to 10 day intervals as needed.
FMBCCBM	Leaf spot (Cercospora)		
	Pimento	See Pepper cluster.	
/14013AA	Potato		Exempt No preharvest interval through 2.45 pounds per acre
FBAMAAX	Early blight (Alternaria)	1.07-2.15 lb/A (10-20%) OR MAI 2.1-2.45 lb/A (10% D)	Foliar application. Apply when plants are 4 to 6 inches high. Repeat at a 10 day interval as needed. OR MAI Formulated with sulfur.
FBASPCN	Late blight (Phytophthora)		
/01016AA	Strawberry		Exempt No preharvest interval through 2.86 pounds per acre.
FMBCMCO	Leaf spot (Mycosphaerella)	0.72-2.86 lb/A (10-20% D)	Foliar application. Apply before or after first sign of disease. Repeat at 7 to 10 day intervals as needed.
/11005AA	Tomato		Exempt No preharvest interval through 2.86 pounds per acre.
FBAMAAX	Early blight (Alternaria)	0.72-2.86 lb/A (10-20% D) OR MAI 2.1-2.45 lb/A (20% D)	Foliar application. Apply weekly if disease appears in plant beds. Dust plants 5 days before or after transplanting. Repeat applications at 7 to 10 day intervals. OR MAI Formulated with sulfur.
FBASPCN	Late blight (Phytophthora)		
FMBCSBL	Leaf spot (Septoria)		

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
03009AA	Walnut		Exempt No preharvest interval through 3.58 pounds per acre.
BAAXAA	Walnut blight (Xanthomonas)	1.07-3.58 lb/A (20% D) OR MAI 2.8-3.5 lb/A (20% D)	Delayed dormant and foliar application. Apply at early prebloom (1 percent pistillate blooms), late prebloom (10 to 20 percent pistillate blooms), and early postbloom. Additional applications are required immediately before or after rain. OR MAI Formulated with sulfur.

AERIAL AND TANK MIX APPLICATIONS

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
001500 AAAAAA	Aerial Application		
	—	Refer to AGRICULTURAL CROPS	All sites except Citrus Fruits

COPPER SULFATE MONOHYDRATE

Listing of Registered Pesticide Products by Formulation

10% (3.5% metallic copper) dust
  copper sulfate monohydrate (024402)
    000279-01054

10% (3.58% metallic copper) dust
  copper sulfate monohydrate (024402)
    000239-01060   000476-02035

20% (7% metallic copper) dust
  copper sulfate monohydrate (024402) plus sulfur (077501)
    000279-00373

20% (7.16% metallic copper) dust
  copper sulfate monohydrate (024402)
    000239-01153   000476-00107

29.4% (10.5% metallic copper) soluble concentrate/solid
  copper sulfate monohydrate (024402)
    004833-00005   017545-00001

999999 State Label Registrations

CA Reg. No.
    000239-04194   000239-04195   000279-04001

EPA Index to Pesticide Chemicals

COPPER SULFATE MONOHYDRATE

Appendix B

Listing of Registration Numbers By Site

/04001AA	Apple	000279-01054
/13005AA	Broccoli	000476-00107 000476-02035
/13007AA	Cabbage	000476-00107 000476-02035
/28073AA	Carrots	000239-01060 000279-00373 000476-00107 000476-02035
/13008AA	Cauliflower	000476-00107 000476-02035
/28003AA	Celery	000239-01060 000239-01153 000279-00373 000476-00107 000476-02035
/02000AA	Citrus Fruits	004833-00005 017545-00001
/05004AA	Peach	000279-00373
/04003AA	Pear	000239-01060 000239-01153 000279-00373 000279-01054 000476-00107 000476-02035
/28017AA	Pepper	000239-01060 000239-01153 000476-00107 000476-02035
/11004AA	Pimento	000239-01060 000239-01153
/14013AA	Potato	000239-01060 000239-01153 000279-00373
/01016AA	Strawberry	000239-01060 000239-01153 000476-00107 000476-02035
/11005AA	Tomato	000239-01060 000239-01153 000279-00373 000476-00107 000476-02035
/03009AA	Walnut	000239-01153 000279-00373 000476-00107 000476-02035

NAC
5II/MA.I
024401

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)* **

TYPE PESTICIDE: Algaecide; Herbicide

FORMULATIONS:
Tech (98.5%, 99%, 99.5%)
G (0.3%, 19.92%, 20%, 24%, 75%, 80%)
P/T (4%, 8.3%, 8.7%, 19.91%, 86.2%)
Cr (93.75%, 95%, 96.5%, 96.9%, 98.8%, 99%, 99.41%, 99.5%, 99.57%, 100%)
SC/S (2%, 4%, 4.95%, 17%, 24.75%, 54.7%, 67%)
SC/L (5%, 5.625%, 6.33%, 6.39%, 15%, 15.1%, 18.9%, 22.2%, 48%)
RTU (1.07%, 1.14%, 2%, 2.18%, 3.46%, 5.6%, 6.3%, 6.33%, 6.5%, 6.93%, 7%, 9.6%, 10%, 11.5%, 12.64%, 12.7%, 13%, 25%)

GENERAL WARNINGS AND LIMITATIONS: Copper sulfate is a nonselective algaecide registered for control of filamentous and planktonic algae in commercial, municipal, and irrigation water systems. It is also an herbicide used mainly for the destruction of tree roots that have obstructed sections of sewer systems. Dosages and concentrations have been calculated for copper as elemental. Concentrations and dosages are given for metallic copper (Cu) with the associated formulations listed as percent copper sulfate (pentahydrate or anhydrous). For copper sulfate pentahydrate labels that did not give the percentage of metallic copper, a metallic content of 25 percent of the active ingredient was inferred for the purpose of calculating dosages. For similar copper sulfate anhydrous labels, a metallic content of 39.81 percent of the active ingredient was inferred. Refer to the formulation pages for the percent or pounds per gallon of metallic copper and the percent of copper sulfate or anhydrous copper sulfate for each registration.
The tolerance of fish to the level of copper in water varies with species as well as water hardness. The following maximum levels of metallic copper are considered safe for these fish in waters of average hardness and slight alkalinity when the chemical is evenly distributed:

Species of fish	Pounds of metallic copper/acre foot of water
Trouts	0.01
Carp	0.22
Suckers	0.22
Catfish	0.27
Pickerel	0.27
Goldfish	0.33
Perches	0.45
Sunfishes	0.90
Black Bass	1.33

Definitions of Terms:
**Copper Sulfate (Pentahydrate and Anhydrous) is the name chosen to present the active ingredient in this report. This name does not appear in either Acceptable Common Names and Chemical Names for the Ingredient Statements of Pesticide Labels or Active Chemical Code List (Shaughnessy). It was chosen to best represent the approved labeling and chemical constitution. The use of this name will be confined to this report unless otherwise noted in future reports.

*copper sulphate
copper sulfate pentahydrate
Bluestone

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

TIME REQUIRED FOR CONTROL: Few hours to 2 days for removal of root blockage. Algae will absorb the chemical within hours after treatment, and control should be evident within 3 to 5 days.

PHYTOTOXICITY TO TARGET WEEDS: Not located

PHYTOTOXICITY TO CROPS: Not located

MODE OF ACTION: For algaecidal action, the absorbed copper causes an imbalance with other metal cofactors resulting in enzyme blockage and eventual death of the algae.

WOODY PLANTS CONTROLLED:

AAACF	roots	

AQUATIC WEEDS CONTROLLED:

QABAA	acnanthes	(c)
AAAAA	algae	
AABAA	anabaena	(a)
YABAA	anacystis	(a)
PABAA	ankistrodesmus	(d)
AACAA	aphanizomenon	(a)
CABAA	asterionella	(a)
AAAAG	blue-green algae	
LABAA	botryococcus	(b)
CADAA	calothrix	(d)
ZADAA	cerastium	(b)
GABAA	chara	(d)
HABAA	chlamydomonas	(c)
PACAA	chlorella	(c)
IABAA	cladophora	(b)
LABAA	closterium	(a)
KABAA	coelastrum	(b)
SADAA	crucigenia	(c)
AADAA	cylindrospermum	(b)
OABAA	cymbella	(c)
LADAA	desmidium	(c)
CACAA	diatoma	
AAAAE	diatoms	
AAAAN	dinoflagellates	
FABAA	draparnaldia	(b)
UABAA	enteromorpha	(b)
WABAA	eudorina	(d)

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

AQUATIC WEEDS CONTROLLED: (continued)

JEABAA	euglena	(b)
KAAAAC	filamentous algae	
KAAAAK	filamentous green algae	
ICADAA	fragilaria	(a)
JGABAA	glenodinium	(b)
IQABAA	gloeocystis	(b)
JCABAA	gloeotrichia	(a)
JMABAA	golenkinia	(c)
JNABAA	gomphonema	(b)
IYAGAA	gomphosphaeria	(a)
KAAAAF	green algae	
IMABAA	hydrodictyon	(a)(e)
EEABBF	leafy pondweed	(f)
IAACAA	melosira	(a)
IYAEAA	microcystis	
INABAA	microspora	(b)
ZAAAAV	mustard yellow algae	
IDABBA	navicula	(a)
ZAAAGZ	neidium	(c)
IGACAA	nitella	(d)
IEABAA	nitzschia	(b)
JAAEAA	nostoc	(c)
IOABAA	oedogonium	
IPAGAA	oocystis	(c)
JBACAA	oscillatoria	(b)
IQACAA	palmella	(c)
IWACAA	pandorina	(d)
KAAAAP	pigmented flagellates	
IIACAA	pithophora	(c)
JBADAA	phormidium	(c)
KAAAAB	planktonic algae	
JIABBA	plectonema boryanum	(b)
IYAHAA	polycystis	(a)
AAABN	pondweed	(f)
ICACAA	rivularia	(a)
EABBJ	sago pondweed	(f)
ISABAA	scenedesmus	(d)
IXACCA	spirogyra	(a)
ILAEAA	staurastrum	(c)
IAADAA	stephanodiscus	(b)
JBAGAA	symploca	(d)
ICAFAA	synedra	(b)
JIABAA	synura	(a)
ICAGAA	tabellaria	(b)
PAHAA	tetraedon	(c)
IJABAA	tribonema	(b)
TACAA	ulothrix	(a)

AQUATIC WEEDS CONTROLLED: (continued)

JHABAA	uroglena	(a)
IWADAA	volvox	(a)
IXADAA	zygnema	(b)

(a) Concentration of 0.06 to 0.13 ppm metallic copper will provide control.

(b) Concentration of 0.13 to 0.24 ppm metallic copper will provide control.

(c) Concentration of 0.24 to 0.36 ppm metallic copper will provide control.

(d) Concentration of 0.36 to 0.5 ppm metallic copper will provide control.

(e) Daily treatments for 5 days are needed for control.

(f) Removal of heavy infestations by mechanical means or with the use of another herbicide may be necessary.

	Site, Dosage and Formulation	Tolerance, Use, Limitations

AGRICULTURAL CROPS

General Warnings and Limitations:
Agricultural and Livestock Tolerances:
Copper is exempt from the requirements of a tolerance in eggs, fish, meat, milk, irrigated crops, and shellfish when it results from the use of copper sulfate as an algaecide or herbicide in irrigation conveyance systems and lakes, ponds, reservoirs, or bodies of water in which fish or shellfish are cultivated.

24004AA	Rice	Exempt
	0.71-1.51 lb Cu/ A-ft [0.26-0.56 ppm Cu] (99% Cr) (15.1% SC/L, anhydrous)	Water treatment for algae control. Apply to a flooded field, twice a year or as needed to maintain control. Apply the higher dosage in deeper water.
	2.49-3.74 lb Cu/A (99% Cr)	

DOMESTIC DWELLINGS, MEDICAL FACILITIES AND SCHOOLS

570000A	Noncrop Areas	
	— (96.5% Cr)	Stump treatment. To decompose old stumps, bore several 1 inch holes as deeply as is possible into stump, fill with chemical and cover with soil. Sprinkle entire stump occasionally over a 4 to 6 week period.

Site, Dosage and Formulation	Tolerance, Use, Limitations

AQUATIC AREAS

General Warnings and Limitations: For algae control, apply in late spring or early summer when algae first appear. The dosages are variable, and depend upon algae species, water hardness, water temperature, amount of algae present, as well as whether water is clear, turbid, flowing or static. Preferably, the water should be clear with temperatures above 60 F (15.6 C). Higher dosages are required at lower water temperatures, higher algae concentrations, and for hard waters. If filamentous algae are abundant, spray mats of floating algae in early afternoon on a sunny day. Static water requires less chemical for algae control than does flowing water. Use the higher dosages for chara, nitella, and filamentous algae (pond scums), and the lower dosages for planktonic algae. If there is uncertainty about the dosage, begin with a lower dose and increase until control is achieved, or until the maximum allowable level has been reached.

Copper sulfate becomes less effective as the biocarbonate alkalinity of water increases. Its effectiveness is significantly reduced when the biocarbonate alkalinity exceeds 150 ppm as calcium carbonate. To control algae in hard waters, such as those commonly found in the midwestern states, a higher dosage is required. Treatment of algae can result in oxygen loss from the decomposition of dead algae. This loss can cause fish suffocation. If the algae cover more than one-third of the total water area, treat in sections. Treat one-third to one-half of the water area in a single operation and wait for 10 to 14 days between treatments. Begin treatment along the shore and proceed outward in bands to allow fish to move into untreated areas. In regions where ponds freeze in winter, treatment should be done 6 to 8 weeks before expected freeze time to prevent masses of decaying algae under an ice cover.

Trout and certain other species of fish may be killed at recommended application rates, especially in soft or acidic waters. Before treating bodies of water, consult proper state authorities, such as the fisheries commission or conservation department to obtain any necessary permits.

Agricultural and Livestock Tolerances:

Copper is exempt from the requirements of a tolerance in eggs, fish, meat, milk, irrigated crops, and shellfish when it results from the use of copper sulfate as an algaecide or herbicide in irrigation conveyance systems and lakes, ponds, reservoirs, or bodies of water in which fish or shellfish are cultivated.

Definition of Terms:

CFS = cubic feet per second.

	Site, Dosage and Formulation	Tolerance, Use, Limitations
	(Potable Water)	
55015MA	Potable Reservoir Water	1 ppm Cu (potable water) General Information: Spray uniformly over the surface of the water, particularly above the infested areas. Applications may be made by any of the following methods: 1. Spray algal growth with algaecide dissolved in water. 2. Place crystals in a burlap bag and drag through the water by boat. 3. Use plastic sprinkling cans to distribute algaecide dissolved in water. 4. Broadcast crystals on water surface. Dissolve copper sulfate in a glass or plastic container. If a metal container must be used, it should be painted, copper lined, or enameled.
	0.05-1.37 lb Cu/A-ft [0.02-0.5 ppm Cu] (99% Cr) (15% SC/L, anhydrous) (15.1% SC/L, anhydrous) (18.9% SC/L) (11.5% RTU, anhydrous)	Water treatment for algae control. Use the higher dosage when methyl orange alkalinity in water exceeds 50 ppm, and for control of resistant blue-green algae.
	2.71 lb Cu/A-ft [1 ppm Cu] (80% G)	
	1 gal product/A-ft (48% SC/L, anhydrous)	
	2.52-3.78 lb Cu/A (99% Cr)	Water treatment for algae control. Use the lower dosage early in the season when algae are young and actively growing, and use the higher dosage later when algae become more resistant. Do not exceed the higher dosage in water that is less than 2 feet deep.
	0.67-1 lb Cu/A-ft [0.25-0.37 ppm Cu] (11.5% RTU, anhydrous) or	Water treatment for control of chara and nitella. When infestation is heavy, drag the bottom with a wire or weighted tape to remove a large portion of the algae before treating the pond.

	Site, Dosage and Formulation	Tolerance, Use, Limitations
	Potable Reservoir Water (continued)	
	0.68-1.02 lb Cu/A-ft [0.25-0.38 ppm Cu] (99% Cr)	
	0.57 lb Cu/A-ft [0.21 ppm Cu] (25% RTU)	Water treatment for algae control. Double the dosage for water with at least 100 ppm methyl orange alkalinity, or for the control of chara and nitella. Repeat treatment after 1 to 2 weeks if algae are still present.
5015MA	Potable Water Conveyance Systems	1 ppm Cu (potable water)
	0.057 lb Cu/CFS/hr [0.25 ppm Cu] (99% Cr)	Water treatment for algae control. Continuous feed method. Maintain application for 45 minutes. Start treatment as soon as the algae start to interfere with the flow of water, and make application at a point of turbulence in the system.
	0.22 lb Cu/CFS/hr [0.98 ppm Cu] (15% SC/L, anhydrous)	--
	0.063-0.13 lb Cu/CFS/hr [0.28-0.56 ppm Cu] (99.5% Cr)	
	0.0013-0.002 lb Cu/CFS/hr [0.006-0.009 ppm Cu] (15% SC/L, anhydrous)	Water treatment for algae control. Continuous feed method. Start treatment when water is first turned into the system and continue throughout the irrigation season.
	0.015-0.021 lb Cu/CFS/hr [0.067-0.095 ppm Cu] (15% SC/L, anhydrous)	Water treatment for control of leafy and sago pondweed. Continuous feed method. Start treatment when water is first turned into the system and continue throughout the irrigation season.

	Site, Dosage and Formulation	Tolerance, Use, Limitations
	Potable Water Conveyance Systems (continued)	
	0.063-0.76 lb Cu/ CFS flow (99% Cr) (99.5% Cr)	Water treatment for algae control. Slug feed method. Repeat application every 2 weeks. An application is required every 5 to 30 miles depending upon alkalinity and algae concentration in the water.
	0.07-0.51 lb Cu/ CFS flow (15% SC/L, anhydrous)	
	(Industrial)	
	General Warnings and Limitations: Badly fouled systems must be cleaned before treatment is begun. Applications may be made in the tower sump, tower basin, or on distribution decks.	
65018MA 65020MA	Air Washer Water Systems Evaporative Condenser Water Systems	General Information: Air washer waters subject to acidification from tobacco dust or other acidifying materials require adjustment of pH with alkaline additives.
	2-3 qt product/ 1,000 gal (6.93% RTU, anhydrous)	Water treatment for algae control. Initial slug application. Repeat until control is evident.
	1-1.5 qt product/ 1,000 gal (6.93% RTU, anhydrous)	Water treatment for algae control. Maintenance application. Repeat weekly or as needed to maintain control.
65019MA	Commercial and Industrial Water Cooling Tower Systems	General Information: Some products may be fed into the system undiluted using a stoker-type feeder, or as a 5 percent water solution, using plastic or ceramic proportioning equipment.
	0.96 oz Cu/ 1,000 gal [7 ppm Cu] (24% G)	Water treatment for algae control. Initial application. Repeat until control is evident.
	0.14 oz Cu/ 1,000 gal [1 ppm Cu] (80% G) or	

Site, Dosage and Formulation	Tolerance, Use, Limitations
Commercial and Industrial Water Cooling Tower Systems (continued)	
1.25 gal product/ 1,000 gal (1.14% RTU, anhydrous)	
2-3 qt product/ 1,000 gal (6.93% RTU, anhydrous)	
0.81 oz Cu/ 1,000 gal [6 ppm Cu] (20% G)	Water treatment for algae control. Initial application. Repeat until control is evident. Formulated with sodium pentachlorophenate and other chlorophenols.
0.46 oz Cu/ 1,000 gal [3.4 ppm Cu] (80% G)	Water treatment for algae control. Initial application. Repeat until control is evident. Formulated with citric acid.
7.7-15.4 fl.oz product/1,000 gal (9.6% RTU, anhydrous)	Water treatment for algae control. Initial application. Repeat until control is evident. Formulated with alkyl*dimethyl benzyl ammonium chloride *alkyl (50% C14, 40% C12, 10% C16).
0.48 oz Cu/ 1,000 gal [3.5 ppm Cu] (24% G)	Water treatment for algae control. Maintenance application. Apply after control is evident and repeat weekly or as needed to maintain control.
0.03-0.14 oz Cu/ 1,000 gal [0.2-1 ppm Cu] (80% G)	
0.63 gal product/ 1,000 gal (1.14% RTU, anhydrous)	
1-1.5 qt product/ 1,000 gal (6.93% RTU, anhydrous)	

Site, Dosage and Formulation	Tolerance, Use, Limitations
Commercial and Industrial Water Cooling Tower Systems (continued)	
0.41 oz Cu/ 1,000 gal [3 ppm Cu] (20% G)	Water treatment for algae control. Maintenance application. Apply after control is evident and repeat weekly or as needed to maintain control. Formulated with sodium pentachlorophenate and other chlorophenols.
1.5-15.4 fl.oz product/1,000 gal (9.6% RTU, anhydrous)	Water treatment for algae control. Maintenance application. Apply after control is evident and repeat weekly or as needed to maintain control. Formulated with alkyl*dimethyl benzyl ammonium chloride *alkyl (50% C14, 40% C12, 10% C16).
0.17-0.5 oz Cu/ 1,000 gal [1.2-3.7 ppm Cu] (8.3% P/T)	Water treatment for algae control. Intermittent application. Frequency and amount of treatment will depend upon the kind and density of algal infestation. Formulated with sodium pentachlorophenate and other chlorophenols.
Evaporative Condenser Water Systems	See Air Washer Water Systems cluster.
(Impounded Water)	--

General Warnings and Limitations: Spray uniformly over the surface of the water, particularly above the infested areas. Applications may be made by any 1 of the following methods: 1. Spray algal growth with algaecide dissolved in water. 2. Place crystals in a burlap bag and drag through the water by boat. 3. Use plastic sprinkling cans to distribute algaecide dissolved in water. 4. Broadcast crystals on water surface. Dissolve copper sulfate in a glass or plastic container. If a metal container must be used, it should be painted, copper lined, or enameled.

	Site, Dosage and Formulation	Tolerance, Use, Limitations
65031MA	Impounded Waters	General Information: Impounded waters include lakes, ponds, reservoirs, farm ponds, and fire ponds. Apply only in areas where algae are well established and growing vigorously. Since still waters allow for lower dosages, try to shut off or divert the flow before beginning to treat each section. Water supply may be resumed 3 to 4 days after treatment. Do not apply in deep water areas where potential for algal growth is limited.
	0.05-1.51 lb Cu/ A-ft [0.02-0.56 ppm Cu] (9% Cr) (99.5% Cr) (15% SC/L, anhydrous) (15.1% SC/L, anhydrous) (18.9% SC/L) (11.5% RTU, anhydrous)	Water treatment for algae control. Use the higher dosage when methyl orange alkalinity in water exceeds 50 ppm, and for control of resistant blue-green algae.
	2.71 lb Cu/A-ft [1 ppm Cu] (80% G)	
	1 gal product/A-ft (48% SC/L, anhydrous)	
	2.52-3.78 lb Cu/A (99% Cr)	Water treatment for algae control. Use the lower dosage early in the season when algae are young and actively growing, and use the higher dosage later when algae become more resistant. Do not exceed the higher dosage in water that is less than 2 feet deep.
	1-2 lb Cu/A (19.91% P/T)	Water treatment for control of chara and nitella. Use the lower dosage when vegetation is young and actively growing, and the higher dosage as the season progresses.

	Site, Dosage and Formulation	Tolerance, Use, Limitations
	Impounded Waters (continued)	
	0.67-1 lb Cu/A-ft [0.25-0.37 ppm Cu] (11.5% RTU, anhydrous)	Water treatment for control of chara. When infestation is heavy, drag the bottom with a wire or weighted tape to remove a large portion of the alga before treating the pond.
	0.68-1.02 lb Cu/A-ft [0.25-0.38 ppm Cu] (99% Cr)	
	0.57 lb Cu/A-ft [0.21 ppm Cu] (25% RTU)	Water treatment for algae control. Double the dosage for water with at least 100 ppm methyl orange alkalinity, or for the control of chara and nitella. Repeat treatment after 1 to 2 weeks if algae are still present.
5034MA	**Industrial Ponds and Spray Ponds**	
	3.26-25.3 lb Cu/million gal [0.4-3 ppm Cu] (80% G)	Water treatment for algae control. Broadcast.
		--
	(Moving Water)	
5021MA	**Irrigation Conveyance Systems**	
	0.11 lb Cu/CFS/hr [0.5 ppm Cu] (25% RTU)	Water treatment for algae control. Continuous feed method. Maintain application for 3 hours.
	0.057 lb Cu/CFS/hr [0.2 ppm Cu] (99% Cr)	Water treatment for algae control. Continuous feed method. Maintain application for 45 minutes. Start treatment as soon as the algae start interfering with the flow of water, and make application at a point of turbulence in the system.
	0.22 lb Cu/CFS/hr [0.98 ppm Cu] (15% SC/L, anhydrous)	
	0.063-0.13 lb Cu/CFS/hr [0.28-0.56 ppm Cu] (99.5% Cr)	

Site, Dosage and Formulation	Tolerance, Use, Limitations
Irrigation Conveyance Systems (continued)	
0.025-0.05 lb Cu/ CFS/hr [0.11-0.2 ppm Cu] (99% Cr)	Water treatment for algae control. Continuous feed method. Maintain application for 12 hours daily. Start treatment when water is first turned into the system and continue throughout the irrigation season.
0.0013-0.002 lb Cu/ CFS/hr (99% Cr) (15% SC/L, anhydrous) (11.5% RTU, anhydrous)	Water treatment for algae control. Continuous feed method. Start treatment when water is first turned into the system and continue throughout the irrigation season.
0.063-0.126 lb Cu/ CFS/hr [0.28-0.56 ppm Cu] (99% Cr)	Water treatment for control of leafy and sago pondweed. Continuous feed method. Maintain application for 12 hours daily. Start treatment when water is first turned into the system and continue throughout the irrigation season.
0.017-0.025 lb Cu/ CFS/hr [0.08-0.11 ppm Cu] (99% Cr)	Water treatment for control of leafy and sago pondweed. Continuous feed method. Start treatment when water is first turned into the system and continue throughout the irrigation season.
0.015-0.021 lb Cu/ CFS/hr [0.067-0.09 ppm Cu] (15% SC/L, anhydrous)	
0.018-0.026 lb Cu/ CFS/hr [0.09-0.11 ppm Cu] (11.5% RTU, anhydrous)	
0.25 lb Cu/ CFS flow (99% Cr)	Water treatment for algae control. Slug feed method. Place chemical in a burlap bag in an area of turblent flow and repeat every 10 to 14 days in warm weather.

	Site, Dosage and Formulation	Tolerance, Use, Limitations
	Irrigation Conveyance Systems (continued)	
	0.063-0.76 lb Cu/ CFS flow (99% Cr) (99.5% Cr)	Water treatment for algae control. Slug feed method. Repeat application every 2 weeks. An application is required every 5 to 30 miles depending upon alkalinity and algae concentration in the water.
	0.07-0.51 lb Cu/ CFS flow (15% SC/L, anhydrous)	
	(Ornamental and Recreational)	
65011MA	Swimming Pool Water	Treated pool effluent should not be discharged where it will drain into lakes, streams, ponds or public water. General Information: Application should be made to a pool free of visible algae. For heavy algal infestations, more drastic treatments, such as superchlorination, may be required to eradicate the algae before treatment. Allow the chlorine level to return to normal before resumption of swimming. Not recommended for pools with marble dust or marcite finish. The chemical is generally effective for 1 month, but effectiveness varies depending on pool conditions, daily chlorination and use. The chemical can also be used to help control swimming pool odors and algae during the winter months. Before application remove all debris from pool. Dissolve soluble concentrates in water and apply to skimmers or along the edge of the pool.
	0.34 lb Cu/ 10,000 gal [4 ppm Cu] (54.7% SC/S)	Water treatment for algae control. Initial application. Apply when first filling the pool, or when pool has visible algae and repeat until control is evident. Follow with maintenance application.
	0.038 lb Cu/ 10,000 gal [0.5 ppm Cu] (67% SC/S)	
	0.23 lb Cu/ 10,000 gal [3 ppm Cu] (6.5% RTU, anhydrous) or	

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

Site, Dosage and Formulation	Tolerance, Use, Limitations
Swimming Pool Water (continued)	
0.6 lb Cu/ 10,000 gal [7 ppm Cu] (7% RTU, anhydrous)	
1.25 qt product/ 10,000 gal (5% SC/L, anhydrous)	Water treatment for algae control. Initial application. Apply when first filling the pool. Follow with maintenance application.
5 fl.oz product/ 10,000 gal (6.33% SC/L, anhydrous) (6.33% RTU, anhydrous)	
1 qt product/ 10,000 gal (6.39% SC/L, anhydrous)	--
10 fl.oz product/ 10,000 gal (22.2% SC/L)	
18 fl.oz product/ 10,000 gal (5.6% RTU, anhydrous)	
3.7 qt product/ 10,000 gal (6.5% RTU, anhydrous)	
8-16 fl.oz product/ 10,000 gal (5.625% SC/L, anhydrous)	Water treatment for algae control. Initial application. Apply the higher dosage for pools with visible algae, and repeat if necessary.
12.8-25.6 fl.oz product/10,000 gal (2.18% RTU, anhydrous)	Water treatment for algae control. Initial application. Apply the higher dosage for pools with visible algae, and repeat if necessary. Formulated with alkyl*dimethyl benzyl ammonium chloride *alkyl (50% C14, 40% C12, 10% C16).

Site, Dosage and Formulation	Tolerance, Use, Limitations
Swimming Pool Water (continued)	
0.033 lb Cu/ 10,000 gal [0.4 ppm Cu] (8.7% P/T)	Water treatment for algae control. Initial application. Repeat until control is evident. Formulated with sodium dichloroisocyanurate.
0.25 cup product/ 10,000 gal (17% SC/S)	Water treatment for algae control. Initial application. If resistant algae should appear, double the dosage and repeat until control is achieved. Formulated with dichlone.
12.8 fl.oz product/10,000 gal (1.07% RTU, anhydrous)	Water treatment for algae control. Initial application. Formulated with tetrasodium ethylenediaminetetraacetate; alkyl*dimethyl benzyl ammonium chloride *alkyl (60% C14, 30% C16, 5% C12, 5% C18); and alkyl*dimethyl ethylbenzyl ammonium chloride *alkyl (68% C12, 32% C14); or alkyl*dimethyl benzyl ammonium chloride *alkyl (50% C14, 40% C12, 10% C16).
25.6 fl.oz product/10,000 gal (10% RTU, anhydrous)	
2.5 fl.oz product/ 10,000 gal (6.33% SC/L, anhydrous) (6.33% RTU, anhydrous)	Water treatment for algae control. Maintenance application. Apply every 7 to 14 days, or as needed to maintain control.
8 fl.oz product/ 10,000 gal (5.625% SC/L, anhydrous) (6.39% SC/L, anhydrous)	
9 fl.oz product/ 10,000 gal (5.6% RTU, anhydrous)	

Site, Dosage and Formulation	Tolerance, Use, Limitations
Swimming Pool Water (continued)	
3.2 fl.oz product/ 10,000 gal (1.07% RTU, anhydrous) (2.18% RTU, anhydrous)	Water treatment for algae control. Maintenance application. Apply every 7 to 14 days, or as needed to maintain control. Formulated with tetrasodium ethylenediaminetetraacetate; alkyl*dimethyl benzyl ammonium chloride *alkyl (60% C14, 30% C16, 5% C12, 5% C18); and alkyl*dimethyl ethylbenzyl ammonium chloride *alkyl (68% C12, 32% C14); or alkyl*dimethyl benzyl ammonium chloride *alkyl (50% C14, 40% C12, 10% C16).
0.34 lb Cu/ 10,000 gal make up water [4 ppm Cu] (54.7% SC/S)	Water treatment for algae control. Make up water application.
1 pt product/ 10,000 gal (1.07% RTU, anhydrous)	Water treatment for algae control. Make up water application. Apply if weekly make up rate is more than 10 percent of total pool capacity. Formulated with tetrasodium ethylenediaminetetraacetate; alkyl*dimethyl benzyl ammonium chloride *alkyl (60% C14, 30% C16, 5% C12, 5% C18); and alkyl*dimethyl ethylbenzyl ammonium chloride *alkyl (68% C12, 32% C14).
0.019 lb Cu/ 10,000 gal [0.2 ppm Cu] (4% P/T)	Water treatment for algae control. Winterizing application.
0.063 lb Cu/ 10,000 gal [0.7 ppm Cu] (24.75% SC/S)	
20 fl.oz product/ 10,000 gal (22.2% SC/L)	
3.7 qt product/ 10,000 gal (6.5% RTU, anhydrous)	
0.74 gal product/ 10,000 gal (12.64% RTU)	

Site, Dosage and Formulation	Tolerance, Use, Limitations
Swimming Pool Water (continued)	
0.05 lb Cu/ 10 000 gal [0.6 ppm Cu] (2% RTU, anhydrous)	Water treatment for algae control. Winterizing application. Formulated with one or a combination of: tetrasodium ethylenediaminetetraacetate; alkyl*dimethyl benzyl ammonium chloride *alkyl (60% C14, 30% C16, 5% C12, 5% C18); alkyl*dimethyl benzyl ammonium chloride *alkyl (50% C14, 40% C12, 10% C16); dialkyl (60% C14, 30% C16, 5% C12, 5% C18) methyl benzyl ammonium chloride; or alkyl*dimethyl ethylbenzyl ammonium chloride *alkyl (68% C12, 32% C14).
21.3 fl.oz product/ 10,000 gal (3.46% RTU, anhydrous)	
0.5 gal product/ 10,000 gal (13% RTU, anhydrous)	
12.8 fl.oz product/ 10,000 gal (1.07% RTU, anhydrous)	--
2.6 qt product/ 10,000 gal (10% RTU, anhydrous)	
(Other Commercial)	
5002MA **Fish Hatcheries, Fish Ponds**	
0.57 lb Cu/A-ft [0.21 ppm Cu] (25% RTU)	Water treatment for algae control. Double the dosage for water with at least 100 ppm methyl orange alkalinity, or for the control of chara and nitella. Repeat treatment after 1 to 2 weeks if algae are still present.
0.45-0.9 lb Cu/A-ft [0.17-0.33 ppm Cu] (18.9% SC/L)	Water treatment for algae control. Dilute 1 part of chemical in 2 parts of water for hand sprayers; and in 5 to 10 parts for power sprayers.

Site, Dosage and Formulation — **Tolerance, Use, Limitations**

(Sewage Systems (Industrial/Home))

General Warnings and Limitations: Copper sulfate is registered for clearing sewer systems of root blockage. Pour one-fourth to one-half of the dosage into toilet nearest sewer line blockage. Flush toilet and repeat until entire dosage has been used. May also be applied through the junction box, stack base, trap or drain openings, laterals or distribution box.

5026MA **Sewage Systems**

General Information: Sewage systems include cesspools, catch basins, storm sewers, storm drains, septic tank drainfields, sewer pumps, force mains, sewers and sewerlines. The chemical is most effective when used during the growing season of trees and shrubs. Badly neglected or completely stopped sewers require mechanical cleaning prior to application. The chemical must come into contact with obstructive roots to be effective; therefore, some flow must be present to carry it to the roots. Do not use in metal vessels, sinks, tub drains or fixture traps, as the chemical may corrode metal trim. Apply in the late evening when the sewer flow will be at a minimum. Repeat as needed to maintain control. Do not apply during extreme storm water flow. Dissolve the soluble concentrates in water before application.

0.4 oz Cu (19.92% G)	Water treatment for root blockage control. Preventive application.
0.48 lb Cu (96.5% Cr)	
1.32 oz Cu (99% Cr)	
2.75-5.5 oz Cu (100% Cr)	
0.13 lb Cu (98.8% Cr) (99% Cr)	

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

Site, Dosage and Formulation	Tolerance, Use, Limitations
Sewage Systems (continued)	
0.25-1.5 lb Cu (75% G) (93.75-100% Cr) (15.1% SC/L, anhydrous)	Water treatment for root blockage control. Use the lower dosage as a preventive measure or for partial stoppage and the higher dosage for complete stoppage. Repeat in 7 to 10 days for complete stoppage.
0.38-0.76 lb Cu/ 4-6 in. diameter of sewerline (98.8% Cr)	
1-2 gal product/ 4 in. diameter of sewerline (6.3% RTU, anhydrous)	
1 gal product/ 300-400 ft length of sewerline (12.7% RTU, anhydrous)	--
1 tablet (86.2% P/T)	Water treatment for root blockage control. Apply to toilet once a week for 4 weeks. Repeat once a month using 1 to 2 tablets per application.
2 tablets/4 in. sewerline (86.2% P/T)	
8 cups product (95% Cr)	Water treatment for root blockage control. For serious stoppage, repeat treatment 2 to 3 times over a 10 day period.
0.5 lb Cu (99% Cr)	Water treatment for root blockage control. Place in cloth bag at the storage well inlet.
0.25 lb Cu (99% Cr)	Water treatment for root blockage control. Replace the clean-out plug in sewerline with the dispenser cartridge. Attach a garden hose to the cartridge and turn the water on moderate flow. When all crystals have been dissolved, disconnect hose and remove dispenser. Repeat every 3 months.
0.016-0.031 lb Cu/ 4 in. sewerline (99% Cr)	Water treatment for root blockage control. Apply the higher dosage once a week for 4 weeks, and the lower dosage weekly for 4 weeks thereafter.

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

Site, Dosage and Formulation	Tolerance, Use, Limitations
Sewage Systems (continued)	
0.12 lb Cu (99% Cr)	Water treatment for root blockage control. Repeat 3 or 4 times over a few day period.
0.25-0.5 oz Cu/ 4 in. sewerline (99% Cr)	Water treatment for root blockage control. Place 2 bags into toilet or clean-out weekly for 4 weeks, and 1 bag weekly for 4 weeks thereafter.
1.5-3 tbls product (99% Cr)	Water treatment for root blockage control. Apply the higher dosage initially, and the lower dosage once a week for 4 weeks thereafter.
0.17-0.34 lb Cu (100% Cr)	Water treatment for root blockage control. Apply the higher dosage initially and the lower dosage twice a year to prevent further growth.
0.38-0.75 oz Cu (100% Cr)	Water treatment for root blockage control. Apply the higher dosage weekly for 4 weeks, and the lower dosage monthly thereafter.
1.75 oz Cu (100% Cr)	Water treatment for root blockage control. Apply every 3 weeks during the spring and fall, and every 2 months at other times. Make initial application at 2 week intervals for slow drainage.
2-3 lb product/ application (0.3% G)	Water treatment for root blockage control. Apply to stack base, trap or drain. Slowly add 1 pail of cold water. Make 3 applications at 15 minutes intervals. Formulated with sodium hydroxide.
2.5 lb product/ application (0.3% G)	Water treatment for root blockage control. Apply to clean-out. Slowly add one pail of cold water. Make 10 applications at 10 minute intervals. Formulated with sodium hydroxide.
2-2.17 lb product/ application (0.3% G)	Water treatment for root blockage control. Apply to stack base or toilet. Make 3 applications at 10 minute intervals. For sluggish sewers, repeat for 4 days and flush with garden hose 1 day after last application. Formulated with sodium hydroxide.

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

Site, Dosage and Formulation	Tolerance, Use, Limitations
Sewage Systems (continued)	
0.03 lb Cu (2% SC/S)	Water application for root blockage control. Apply to trap or drain openings. For slow flowing drains, repeat in 24 hours. Repeat until control is evident.
0.038 lb Cu (4.95% SC/S)	Formulated with sodium hydroxide.
0.07 lb Cu/50 ft length of sewer-line (4% SC/S)	

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

Listing of Registered Pesticide Products by Formulation

98.5% (metallic Cu: 25%) technical chemical

copper sulfate pentahydrate (024401)
000140-00041*
*metallic copper inferred

99% (metallic Cu: 25%) technical chemical

copper sulfate pentahydrate (024401)
039295-00003*
*metallic copper inferred

99% (metallic Cu: 25.2%) technical chemical

copper sulfate pentahydrate (024401)
001109-00001 001109-00019 001109-00021 001109-00027
001109-00032 001278-00005 008901-00006 009905-00001
035896-00003

99.5% (metallic Cu: 25.2%) technical chemical

copper sulfate pentahydrate (024401)
011435-00001 046218-00001

0.3% granular

copper sulfate pentahydrate (024401) plus sodium hydroxide (075603)
000399-00009 008132-00002 008132-00003 010700-00002

19.92% (metallic Cu: 4.98%) granular

copper sulfate pentahydrate (024401)
010564-00001*
*metallic copper inferred

20% (metallic Cu: 5.09%) granular

copper sulfate pentahydrate (024401) plus sodium pentachlorophenate and other chlorophenols (063003)
003682-00029

24% (metallic Cu: 6%) granular

copper sulfate pentahydrate (024401)
003682-00023*
*metallic copper inferred

75% (metallic Cu: 18.75%) granular

copper sulfate pentahydrate (024401)
005605-00173*
*metallic copper inferred

80% (metallic Cu: 20%) granular

copper sulfate pentahydrate (024401) plus citric acid (021801)
010932-00002

80% (metallic Cu: 20.4%) granular

copper sulfate pentahydrate (024401)
001706-00055 001706-00056

Listing of Registered Pesticide Products by Formulation (continued)

4% (metallic Cu: 1%) pelleted/tableted
- copper sulfate pentahydrate (024401)
  - 004829-00048*
    - *metallic copper inferred

8.3% (metallic Cu: 2.08%) pelleted/tableted
- copper sulfate pentahydrate (024401) plus sodium pentachlorophenate and other chlorophenols (063003)
  - 003876-00005*
    - *metallic copper inferred

8.7% (metallic Cu: 2.18%) pelleted/tableted
- copper sulfate pentahydrate (024401) plus sodium dichloroisocyanurate (081404)
  - 009087-00006*
    - *metallic copper inferred

19.91% (metallic Cu: 5%) pelleted/tableted
- copper sulfate pentahydrate (024401)
  - 007364-00026

86.2% (metallic Cu: 21.6%) pelleted/tableted
- copper sulfate pentahydrate (024401)
  - 006209-00001*
    - *metallic copper inferred

93.75% (metallic Cu: 23.44%) crystalline
- copper sulfate pentahydrate (024401)
  - 009283-00001*
    - *metallic copper inferred

95% (metallic Cu: 24.13%) crystalline
- copper sulfate pentahydrate (024401)
  - 011332-00001*
    - *metallic copper inferred

96.5% (metallic Cu: 24.13%) crystalline
- copper sulfate pentahydrate (024401)
  - 000192-00077*
    - *metallic copper inferred

96.9% (metallic Cu: 24.6%) crystalline
- copper sulfate pentahydrate (024401)
  - 007687-00001

98.8% (metallic Cu: 25.3%) crystalline
- copper sulfate pentahydrate (024401)
  - 013892-00001

Listing of Registered Pesticide Products by Formulation (continued)

99% (metallic Cu: 25%) crystalline

copper sulfate pentahydrate (024401)
000779-00098* 001109-00020 003640-00077* 004990-00020*
005576-00048* 006646-00004* 010174-00001* 010779-00001*
017106-00001* 034797-00019 036416-00001* 037952-00001
039271-00001* 039295-00008
*metallic copper inferred

99% (metallic Cu: 25.2%) crystalline

copper sulfate pentahydrate (024401)
000430-00039 000829-00210 001109-00001 001109-00019
001109-00020 001109-00021 001109-00026 001109-00027
001109-00032 001278-00008 001386-00304 002800-00058
003286-00030 004931-00134 007401-00326 007792-00001
008460-00001 008590-00405 008901-00012 008901-00021
008959-00021 009669-00001 009698-00001 009768-00036
009768-00037 010103-00002 010103-00004 010103-00005
010103-00006 010103-00009 010267-00001 010827-00061
011333-00006 011450-00002 015015-00001 037952-00001
038539-00001 045450-00001 045450-00002

99.41% (metallic Cu: 25%) crystalline

copper sulfate pentahydrate (024401)
033855-00001*
*metallic copper inferred

99.5% (metallic Cu: 25.2%) crystalline

copper sulfate pentahydrate (024401)
011435-00002 046218-00002

99.57% (metallic Cu: 25%) crystalline

copper sulfate pentahydrate (024401)
002169-00187*
*metallic copper inferred

100% (metallic Cu: 25%) crystalline

copper sulfate pentahydrate (024401)
000427-00048* 005094-00001* 006741-00003* 010266-00001*
010906-00001*
*metallic copper inferred

2% (metallic Cu: 0.5%) soluble concentrate/solid

copper sulfate pentahydrate (024401) plus sodium hydroxide (075603)
009902-00001*
*metallic copper inferred

4% (metallic Cu: 1%) soluble concentrate/solid

copper sulfate pentahydrate (024401) plus sodium hydroxide (075603)
010694-00001*
*metallic copper inferred

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

Listing of Registered Pesticide Products by Formulation (continued)

4.95% (metallic Cu: 1.24%) soluble concentrate/solid
copper sulfate pentahydrate (024401) plus sodium hydroxide (075603)
018632-00001*
*metallic copper inferred

17% (metallic Cu: 4.25%) soluble concentrate/solid
copper sulfate pentahydrate (024401) plus dichlone (029601)
008729-00003*
*metallic copper inferred

24.75% (metallic Cu: 6.19%) soluble concentrate/solid
copper sulfate pentahydrate (024401)
007124-00051*
*metallic copper inferred

54.7% (metallic Cu: 13.68%) soluble concentrate/solid
copper sulfate pentahydrate (024401)
004829-00028*
*metallic copper inferred

67% (metallic Cu: 16.75%) soluble concentrate/solid
copper sulfate pentahydrate (024401)
007151-00003*
*metallic copper inferred

5% (metallic Cu: 2%) soluble concentrate/liquid
copper sulfate anhydrous (024401)
007124-00057*
*metallic copper inferred

5.625% (metallic Cu: 2.25%) soluble concentrate/liquid
copper sulfate anhydrous (024401)
027588-00002

6.33% (metallic Cu: 2.52%) soluble concentrate/liquid
copper sulfate anhydrous (024401)
007152-00078*
*metallic copper inferred

6.39% (metallic Cu: 2.54%) soluble concentrate/liquid
copper sulfate anhydrous (024401)
007124-00049* 007124-00052* 009556-00020*
*metallic copper inferred

15% (metallic Cu: 0.58 lb/gal or 6%) soluble concentrate/liquid
copper sulfate anhydrous (024401)
010103-00010

15.1% (metallic Cu: 0.59 lb/gal or 6%) soluble concentrate/liquid
copper sulfate anhydrous (024401)
038539-00002 045450-00004

Listing of Registered Pesticide Products by Formulation (continued)

18.9% (metallic Cu: 0.5 lb/gal or 4.73%) soluble concentrate/liquid

copper sulfate pentahydrate (024401)
041041-00001*
*metallic copper inferred

22.2% (metallic Cu: 5.65%) soluble concentrate/liquid

copper sulfate pentahydrate (024401)
033230-00001

48% (metallic Cu: 19.1%) soluble concentrate/liquid

copper sulfate anhydrous (024401)
001439-00193

1.07% (metallic Cu: 0.43%) liquid-ready to use

copper sulfate anhydrous (024401), tetrasodium ethylenediaminetetraacetate (039107), alkyl*dimethyl benzyl ammonium chloride *alkyl (60% C14, 30% C16, 5% C12, 5% C18) (069104) plus alkyl*dimethyl ethylbenzyl ammonium chloride * alkyl (68% C12, 32% C14) (069154)
042321-00001**
**metallic copper inferred

1.14% (metallic Cu: 0.45%) liquid-ready to use

copper sulfate anhydrous (024401)
003682-00022

2% (metallic Cu: 0.07 lb/gal or 0.8%) liquid-ready to use

copper sulfate anhydrous (024401), alkyl*dimethyl benzyl ammonium chloride *alkyl (60% C14, 30% C16, 5% C12, 5% C18) (069104) plus dialkyl (60% C14, 30% C16, 5% C12, 5% C18) methyl benzyl ammonium chloride (069119)
007124-00028**
**metallic copper inferred

2.18% (metallic Cu: 0.87%) liquid-ready to use

copper sulfate anhydrous (024401) plus alkyl*dimethyl benzyl ammonium chloride *alkyl (50% C14, 40% C12, 10% C16) (069105)
044723-00001**
**metallic copper inferred

3.46% (metallic Cu: 1.38%) liquid-ready to use

copper sulfate anhydrous (024401), alkyl*dimethyl benzyl ammonium chloride *alkyl (60% C14, 30% C16, 5% C12, 5% C18) (069104) plus dialkyl (60% C14, 30% C16, 5% C12, 5% C18) methyl benzyl ammonium chloride (069119)
007152-00020**
**metallic copper inferred

5.6% (metallic Cu: 2.23%) liquid-ready to use

copper sulfate anhydrous (024401)
000278-00045*
*metallic copper inferred

Listing of Registered Pesticide Products by Formulation (continued)

6.3% (metallic Cu: 2.51%) liquid-ready to use
copper sulfate anhydrous (024401)
010155-00022*
*metallic copper inferred

6.33% (metallic Cu: 2.52%) liquid-ready to use
copper sulfate anhydrous (024401)
007152-00077*
*metallic copper inferred

6.5% (metallic Cu: 2.59%) liquid-ready to use
copper sulfate anhydrous (024401)
003524-00034* 005605-00098*
*metallic copper inferred

6.5% (metallic Cu: 0.25 lb/gal or 2.59%) liquid-ready to use
copper sulfate anhydrous (024401)
004829-00030*
*metallic copper inferred

6.93% (metallic Cu: 2.76%) liquid-ready to use
copper sulfate anhydrous (024401)
010867-00006*
*metallic copper inferred

7% (metallic Cu: 0.658 lb/gal or 2.79%) liquid-ready to use
copper sulfate anhydrous (024401)
007124-00023*
*metallic copper inferred

9.6% (metallic Cu: 3.82%) liquid-ready to use
copper sulfate anhydrous (024401) plus alkyl*dimethyl benzyl ammonium chloride *alkyl (50% C14, 40% C12, 10% C16) (069105)
034571-00008**
**metallic copper inferred

10% (metallic Cu: 3.98%) liquid-ready to use
copper sulfate anhydrous (024401) plus alkyl*dimethyl benzyl ammonium chloride *alkyl (50% C14, 40% C12, 10% C16) (069105)
040916-00003**
**metallic copper inferred

11.5% (metallic Cu: 0.42 lb/gal or 4.6%) liquid-ready to use
copper sulfate anhydrous (024401)
009768-00035

12.64% (metallic Cu: 3.16%) liquid-ready to use
copper sulfate pentahydrate (024401)
007124-00058*
*metallic copper inferred

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

Listing of Registered Pesticide Products by Formulation (continued)

12.7% (metallic Cu: 5.06%) liquid-ready to use
  copper sulfate anhydrous (024401)
    012204-00001*
      *metallic copper inferred

13% (metallic Cu: 5.18%) liquid-ready to use
  copper sulfate anhydrous (024401), alkyl*dimethyl benzyl ammonium chloride *alkyl (60% C14, 30% C16, 5% C12, 5% C18) (069104) plus dialkyl (60% C14, 30% C16, 5% C12, 5% C18) methyl benzyl ammonium chloride (069119)
    007124-00039**
      **metallic copper inferred

25% (metallic Cu: 0.63 lb/gal or 6.25%) liquid-ready to use
  copper sulfate pentahydrate (024401)
    046923-00001

999 State Label Registrations

AZ Reg. No.
035051-03736

CA Reg. No.
002935-09848   005719-04897

FL Reg. No.
037347-03117

MI Reg. No.
000595-04553

OR Reg. No.
002935-09851

TX Reg. No.
003286-08041   035994-06090

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

Appendix B

Listing of Registration Numbers By Site

AGRICULTURAL CROPS

04AA **Rice**
001109-00032 008901-00021 039295-00008 045450-00001
045450-00002 045450-00004

DOMESTIC DWELLINGS, MEDICAL FACILITIES AND SCHOOLS

000A **Noncrop Areas**
000192-00077

AQUATIC AREAS

(Potable Water)

15MA **Potable Reservoir Water**
000430-00039 000829-00210 001109-00001 001109-00019
001109-00020 001109-00021 001109-00026 001109-00027
001109-00032 001278-00008 001439-00193 001706-00055
001706-00056 008901-00012 008901-00021 009669-00001
009768-00035 009768-00036 009768-00037 010103-00002
010103-00004 010103-00005 010103-00006 010103-00009
010103-00010 037952-00001 038539-00001 038539-00002
039295-00008 041041-00001 046923-00001

15MA **Potable Water Conveyance Systems**
010103-00010 011435-00002 038539-00001 038539-00002
046218-00002

(Industrial)

18MA **Air Washer Water Systems**
010867-00006

19MA **Commercial and Industrial Water Cooling Tower Systems**
001706-00055 001706-00056 003682-00022 003682-00023
003682-00029 003876-00005 010867-00006 034571-00008

20MA **Evaporative Condenser Water Systems**
10867-00006

Listing of Registration Numbers By Site (continued)

(Impounded Water)

31MA **Impounded Waters**

General Information: Impounded waters include lakes, ponds, reservoirs, farm ponds, and fire ponds.

000430-00039 000829-00210 001109-00001 001109-00019
001109-00020 001109-00021 001109-00026 001109-00027
001109-00032 001278-00008 001386-00304 001439-00193
001706-00055 001706-00056 007364-00026 008590-00405
008901-00012 008901-00021 009669-00001 009768-00035
009768-00036 009768-00037 010103-00002 010103-00004
010103-00005 010103-00006 010103-00009 010103-00010
010827-00061 011435-00002 037952-00001 038539-00001
039295-00008 041041-00001 045450-00001 045450-00002
045450-00004 046218-00002 046923-00001

34MA **Industrial Ponds and Spray Ponds**

001706-00055 001706-00056

(Moving Water)

21MA **Irrigation Conveyance Systems**

001109-00001 001109-00027 001278-00008 008901-00012
008901-00021 009768-00035 009768-00036 009768-00037
010103-00010 011435-00002 037952-00001 038539-00001
038539-00002 039295-00008 046218-00002 046923-00001

(Ornamental and Recreational)

11MA **Swimming Pool Water**

000278-00045 003524-00034 004829-00028 004829-00030
004829-00048 005605-00098 007124-00023 007124-00028
007124-00039 007124-00049 007124-00051 007124-00052
007124-00057 007124-00058 007151-00003 007152-00020
007152-00077 007152-00078 008729-00003 009087-00006
027588-00002 033230-00001 040916-00003 042321-00001
044723-00001

(Other Commercial)

2MA **Fish Hatcheries, Fish Ponds**

041041-00001 046923-00001

Listing of Registration Numbers By Site (continued)

(Sewage Systems (Industrial/Home))

)26MA Sewage Systems

General Information: Sewage systems include cesspools, catch basins, storm sewers, storm drains, septic tank drainfields, sewer pumps, force mains, sewers and sewerlines.

000192-00077 000399-00009 000427-00048 000779-00098
000829-00210 001109-00001 001109-00020 001109-00021
001109-00027 001278-00008 002169-00187 002800-00058
003286-00030 003640-00077 004931-00134 004990-00020
005094-00001 005576-00048 005605-00173 006209-00001
006646-00004 006741-00003 007401-00326 007687-00001
007792-00001 008132-00002 008132-00003 008460-00001
008959-00021 009283-00001 009698-00001 009902-00001
010155-00022 010174-00001 010266-00001 010267-00001
010564-00001 010694-00001 010700-00002 010779-00001
010906-00001 011332-00001 011333-00006 011450-00002
012204-00001 013892-00001 015015-00001 017106-00001
018632-00001 033855-00001 034797-00019 036416-00001
038539-00001 039271-00001 039295-00008 045450-00001
045450-00002 045450-00004

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COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

Listing of Registration Numbers

046923-00001
046218-00002
046218-00001
045450-00004
045450-00002
045450-00001
044723-00001
042321-00001
041041-00001
040916-00003
039295-00008
039295-00003
039271-00001
038539-00002
038539-00001
037952-00001
036416-00001
035896-00003
034797-00019
034571-00008
033855-00001
033230-00001
027588-00002
018632-00001
017106-00001
015015-00001
013892-00001
012204-00001
011450-00002
011435-00002
011435-00001
011333-00006
011332-00001
010932-00002
010906-00001
010867-00006
010827-00061
010779-00001
010700-00002
010694-00001
010564-00001
010267-00001
010266-00001
010174-00001
010155-00022
010103-00010
010103-00009
010103-00006
010103-00005
010103-00004
010103-00002
009905-00001
009902-00001
009768-00037
009768-00036
009768-00035
009698-00001
009669-00001
009556-00020
009283-00001
009087-00006
008959-00021
008901-00021
008901-00012
008901-00006
008729-00003
008590-00405
008460-00001
008132-00003
008132-00002
007792-00001
007687-00001
007401-00326
007364-00026
007152-00078
007152-00077
007152-00020
007151-00003
007124-00058
007124-00057
007124-00052
007124-00051
007124-00049
007124-00039
007124-00028
007124-00023
006741-00003
006646-00004
006209-00001
005605-00173
005605-00098
005576-00048
005094-00001
004990-00020
004931-00134
004829-00048
004829-00030
004829-00028
003876-00005
003682-00029
003682-00023
003682-00022
003640-00077
003524-00034
003286-00030
002800-00058
002169-00187
001706-00056
001706-00055
001439-00193
001386-00304
001278-00008
001278-00005
001109-00032*
001109-00027*
001109-00026
001109-00021*
001109-00020
001109-00019*
001109-00001*
000829-00210
000779-00098
000430-00039
000427-00048
000399-00009
000278-00045
000192-00077
000140-00041

*crystallines that were double coded as technicals

EPA Index to Pesticide Chemicals

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

Auxiliary Documentation

(1) The four 0.3% granular products (formulated with sodium hydroxide) for root control were included in the report. The dosages were given in product because of the small percentage of copper sulfate.

(2) Reg. # 192-77: for decomposing stumps, the code used was 67000, noncrop areas, and was placed under DOMESTIC DWELLINGS.

(3) Labels that just said copper sulfate were assumed to be pentahydrate, unless the % metallic indicated anhydrous.

(4) Crystalline products with algaecidal uses that were also for reformulating purposes were double-coded as technical chemicals.

(5) Reservoirs were coded under 65031 and 65015.

(6) These labels have flowing and impounded water dosage discrepancies:

Reg. No.	Concentration given on label	Concentration we calculated
Flowing water sites		
46218-2	1 ppm Cu	0.28-0.56 ppm Cu
46923-1	1 ppm Cu	0.4 ppm Cu (Considering the dose/min, not per hour. The per minute and per hour doses do not give same concentration.
38539-1	1 ppm Cu	0.22 ppm Cu
Impounded water sites		
11435-2	0.5 ppm Cu	0.13 ppm
46218-2	"	"
46923-1	"	"
41041-1	0.5 ppm	0.17 ppm

(7) Label #'s 46923-1 and 41041-1; impounded water sites: Dosages almost doubles with each 1 foot increase in depth of the water. We thought it to be an error and included only the one-foot depth dose.

Auxiliary Documentation
(continued)

(8) Rice labels: Some doses were given per A-Ft and others (2) for surface acre, which were higher. Both of these were used.

(9) Label # 39295-8: No specific dose for impounded waters was given. We inferred 5.44 lb per acre foot from the example.

(10) Tolerance for potable water was taken from CFR 21, section 193.90.

(11) Label 1278-8: Algae control in impounded waters gives a general dose and also refers to a booklet 10 for alga species doses. We did not use the booklet because (A) it is not stamped accepted, (B) some doses go as high as 10 ppm which is very toxic to fish.

(12) The Mountain Brand label brochure has a livestock restriction for farm ponds; but the more recent registrations like 38539-2 and 41041-1 do not have any restriction and in fact allow use of the treated water for swimming, drinking, fishing etc. immediately after treatment. We followed the recent trend and did not include any restrictions in this report.

(13)Label # 27588-2: (5.625% SC/L) was determined to be anhydrous, because % metallic was 2.25%.

(14) Label # 010932-2 (80% Dust): Product Bulletin A-102 was ignored because intent was unclear.

(15) Label # 38539-2 reads (6% metallic or 0.59 lb/gal) anhydrous; Label # 45450-4 reads (6% metallic or 10.59 lb/gal) anhydrous; we assumed 10.59 lb/gal was an error and used 0.59 lb/gal.

(16) For slug application in irrigation systems, Label # 1278-8, 11435-2, and # 46218-2 read "A pile is necessary every 50 to 30 miles." We assumed this to be an error and wrote 5 to 30 miles. (from 10103-10) in this report

(17) Label # 5427-5: 11% granular (monohydrate), was included in the 024402 report.

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

Auxiliary Documentation
(continued)

(18) Labels with inferred metallic copper:

000140-00041* 000192-00077* 000278-00045* 000427-00048*
000779-00098* 002169-00187* 003524-00034* 003640-00077*
003682-00023* 003876-00005* 004829-00028* 004829-00030*
004829-00048* 004990-00020* 005094-00001* 005576-00048*
005605-00098* 005605-00173* 006209-00001* 006646-00004*
006741-00003* 007124-00023* 007124-00028* 007124-00039*
007124-00049* 007124-00051* 007124-00052* 007124-00057*
007124-00058* 007151-00003* 007152-00020* 007152-00077*
007152-00078* 008729-00003* 009087-00006* 009283-00001*
009556-00020* 009902-00001* 010155-00022* 010174-00001*
010266-00001* 010564-00001* 010694-00001* 010779-00001*
010867-00006* 010906-00001* 011332-00001* 012204-00001*
017106-00001* 018632-00001* 033855-00001* 034571-00008*
036416-00001* 039271-00001* 039295-00003* 040916-00003*
041041-00001* 042321-00001* 044723-00001*

(19) Anhydrous Copper Sulfate Labels:

000278-00045* 001439-00193 003524-00034* 003682-00022
004829-00030* 005605-00098* 007124-00023* 007124-00028*
007124-00039* 007124-00049* 007124-00052* 007124-00057*
007152-00020* 007152-00077* 007152-00078* 009556-00020*
009768-00035 010103-00010 010155-00022* 010867-00006*
012204-00001* 027588-00002 034571-00008* 038539-00002
040916-00003* 042321-00001* 044723-00001* 045450-00004
* = inferred metallic copper

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COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)* **

TYPE PESTICIDE: Fungicide

FORMULATIONS:

Tech	(15%, 99%, 99.5%)
FI	(50%)
G	(20%, 75%)
Cr	(93.75%, 96.5%, 96.9%, 99%, 99.41%, 100%)
SC/S	(25.5%, 26.8%, 32%, 37.7%, 94.3%, 98%, 98.5%, 99%)
SC/L	(8.5%, 15%, 15.1%)
RTU	(0.76%, 3.84%, 3.5%, 6.93%, 15%)

GENERAL WARNINGS AND LIMITATIONS: Dosages and concentrations have been calculated in metallic copper (Cu) (except for Agricultural Crops and Ornamentals) with the associated formulations given in percent copper sulfate (pentahydrate or anhydrous). For copper sulfate pentahydrate labels that do not give the percentage of metallic copper, a metallic content of 25 percent of the active ingredient was inferred for the purpose of calculating dosages. For similar copper sulfate anhydrous labels, a metallic content of 39.81 percent of the active ingredient was inferred. Refer to the formulation pages for the percent or pounds per gallon of metallic copper and the percent of copper sulfate or anhydrous copper sulfate for each registration.

Definitions of Terms:
a.i. - active ingredient
AWPA - American Wood-Preservers' Association
tbls - tablespoons

**Copper Sulfate (Pentahydrate and Anhydrous) is the name chosen to present the active ingredient in this report. This name does not appear in either Acceptable Common Names and Chemical Names for the Ingredient Statements of Pesticide Labels or Active Chemical Code List (Shaughnessy). It was chosen to best represent the approved labeling and chemical constitution. The use of this name will be confined to this report unless otherwise noted in future reports.

*copper sulphate
copper sulfate pentahydrate
Bluestone

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

AGRICULTURAL CROPS

General Warnings and Limitations: Copper sulfate is exempt from requirement for tolerances when used on raw agricultural commodities (up to harvest) according to good agricultural practice. Dosage rates are given in terms of the ratio of pounds of copper sulfate pentahydrate, pounds of hydrated lime, and gallons of water (e.g. 10-10-100 Bordeaux mixture). To prepare a Bordeaux mixture, fill the tank 1 quarter full with water. Then, with agitator running, wash the formulation into the tank through a copper, bronze, plastic, or stainless steel screen. Add water so the tank is three-quarters full and wash the hydrated lime through the screen. Then add the balance of the water. Do not allow mixture to stand before use. Spray mixtures and liquid formulations are corrosive to certain metals. A Bordeaux paste is prepared by dissolving 1 pound of copper sulfate pentahydrate in 3 quarts of water and mixing with 1.5 pounds of slaked lime in 3 quarts of water.

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
1AA	Almond		Exempt Apply up to a 12-12-100 mixture.
CB	Brown rot blossom and twig blight (Monilinia)	10-10-100 (99% Cr) (94.3-99% SC/S) (15-15.1% SC/L, anhydrous) or 12-12-100 (94.3-98% SC/S)	Dormant, delayed dormant, and foliar application. For brown rot, apply when buds begin to swell and at petal fall in certain areas. For shothole, apply as dormant spray in late or in early spring just before buds swell.
EL	Shothole (Coryneum blight)		
1AA	Apple		Exempt Apply up to a 10-10-100 mixture.
AC	Copper deficiency (exanthema)	10-10-100 (99% Cr) (99% SC/S)	Foliar application. Apply to foliage in early summer.
AU	Crown gall (Agrobacterium)	Bordeaux paste (99% Cr) (99% SC/S)	Wound treatment. After infection has been cut away, disinfect wounds and allow to dry for several days. Then cover the wounds with Bordeaux paste.
BA	Western white root rot (Rosellinia)	10-10-100 (99% Cr) (99% SC/S)	Soil and base of tree application. Apply when infection is detected to base and soil around trees.

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
01AA	Apricot		Exempt Apply up to a 12-12-100 mixture.
MCB	Brown rot blossom and twig blight (Monilinia)	10-10-100 (99% Cr) (94.3-99% SC/S) (15-15.1% SC/L, anhydrous) or 12-12-100 (94.3-98% SC/S)	Dormant, delayed dormant, and foliar application. For brown rot, apply when buds begin to swell or in red bud to popcorn, and at petal fall depending upon area. For shothole, apply in late fall and/or early spring.
CEL	Shothole (Coryneum blight)		
02AA	Blackberry		Exempt Apply up to a 10-10-100 mixture.
05AA	Loganberry		
06AA	Raspberry		
07AA	Youngberry		
EAH	Anthracnose (Elsinoe)	10-10-100 (99% Cr) (99% SC/S)	Dormant, delayed dormant application. Apply in late winter (February and March) just before leaves open.
QBB	Cane blight		
SBL	Leaf and cane spot (Septoria)		
PBW	Leaf rust (Phragmidium) (on raspberry)		
QBB	Orange rust		
73AA	Carrots		Exempt Apply up to a 10-10-100 mixture.
AAX	Late blight (Alternaria)	10-10-100 (99% Cr) (99% SC/S)	Foliar application. Apply 4 weeks after seeding and then at 7 to 9 day intervals for at least 4 to 5 applications.
3AA	Celery		Exempt
SBL	Late blight (Septoria)	10-10-100 (99% Cr) (99% SC/S) or 4-4-100 (98.5% SC/S)	Foliar application. Apply 4 weeks after seeding and then at 7 to 9 day intervals for at least 4 to 5 applications.

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
02AA	Cherry		Exempt Apply up to a 10-10-100 mixture.
PDZ	Bacterial canker (gummosis) (Pseudomonas)	Bordeaux paste (99% Cr) (99% SC/S)	Wound treatment. After infection has been cut away, disinfect wounds and allow to dry for several days. Then cover the wounds with Bordeaux paste.
MCB	Brown rot blossom and twig blight (Monilinia)	10-10-100 (99% Cr) (94.3-99% SC/S) (15-15.1% SC/L, anhydrous)	Delayed dormant application. Apply when buds begin to swell.
	(sour cherry)		
CDJ	Cherry leaf spot (Coccomyces)	10-10-100 (99% Cr) (99% SC/S) (15-15.1% SC/L, anhydrous)	Foliar application. Apply as a full coverage spray after petal fall or as recommended by a State Cooperative Agricultural Extension Agent.
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OAA	Citrus Fruits		Exempt Apply up to a 3-4.5-100 mixture.
CN	Brown rot (Phytophthora)	5-6-100 [1.885 lb a.i.] [500-700 gal/A] (37.7% SC/S)	Use limited to central CA. Foliar application. Apply as a full coverage spray to mature trees in fall prior to wet season.
BL	Leaf and fruit spot (Septoria)		
CN	Brown rot (Phytophthora)	3-4-100 [1.13 lb a.i.] or 5-6-100 [1.885 lb a.i.] (37.7% SC/S)	Use limited to central CA. Foliar application. Apply low rate as a skirt spray on soil, trunk and lower 3 to 4 feet of foliage. Apply in fall just prior to wet season. Apply high rate as a full coverage spray in coastal areas or other areas where no copper injury has been found.
		2-2-100 (94.3% SC/S)	Foliar application. Apply during the fall or winter periods when disease may be a problem.

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
	Citrus Fruits (continued)		
	(lemon, orange, grapefruit)		
JPCN	Brown rot (Phytophthora)	3-4.5-100 or 2-6-100 (99% Cr) (99% SC/S) (15-15.1% SC/L, anhydrous)	Foliar and soil application. Apply 3-4.5-100 where there is no history of copper injury. Apply 2-6-100 with 3 pounds zinc sulfate where injury has occured. Apply 6 gallons of spray on skirt of tree 3 to 4 feet high, and 2 to 4 gallons on trunk and ground under tree. If *Phytophthora hibernalis* is present, use 10 to 25 gallons to completely cover each tree. Apply in November or December just before or after first rain. In a severe brown rot season, apply again in January or February.
JPCN SBL	Brown rot (Phytophthora) Leaf and fruit spot (Septoria) (in central CA)	2-6-100 (99% Cr) (99% SC/S) (15-15.1% SC/L, anhydrous)	Foliar application. Add 3 pounds zinc sulfate. Apply 10 to 25 gallons to completely cover each tree. Apply in October, November or December just before or just after first rain. This application is also used for copper and zinc deficiencies.
JPCN DAD EAH	Brown rot (Phytophthora) Melanose (Diaporthe) Scab (spot anthracnose) (Elsinoe)	2-2-100 (98.5% SC/S)	Foliar application. Use for brown rot of lemons, melanose of grapefruit, and scab of grapefruit and oranges.
OOAA	**Curcurbits**		Exempt Apply up to a 10-10-100 mixture.
EBI PEA	Bacterial wilt (Erwinia) Downy mildew (Pseudoperonospora)	10-10-100 (99% Cr) (99% SC/S)	Foliar application. Apply when plants are young for bacterial wilt or at first sign of disease for downy mildew. Repeat at 7 to 10 day intervals.

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COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
01AA	**Eggplant**		Exempt Apply up to a 10-10-100 mixture.
QBB QBB	Leaf spot and fruit spot	10-10-100 (99% Cr) (99% SC/S)	Foliar application. Apply before disease appears. Repeat at 7 to 10 day intervals as needed.
	Loganberry	See Blackberry cluster.	
03AA 04AA	**Nectarine** **Peach**		Exempt Apply up to a 12-12-100 mixture.
PDZ AAU PCN	Bacterial canker (gummosis) (Pseudomonas) Crown gall (Agrobacterium) Phytophthora canker (crown rot)	Bordeaux paste (99% Cr) (99% SC/S)	Wound treatment. After infection has been cut away, disinfect wounds and allow to dry for several days. Then cover the wounds with Bordeaux paste.
MCB AB EL	Brown rot blossom and twig blight (Monilinia) Leaf curl (Taphrina) Shothole (Coryneum blight)	10-10-100 (99% Cr) (94.3-99% SC/S) (15-15.1% SC/L, anhydrous) or 12-12-100 (94.3-98% SC/S)	Dormant, delayed dormant, and foliar application. For brown rot, apply when buds begin to swell or at petal fall in certain areas. For leaf curl, apply in late fall or in red bud to popcorn. For shothole, apply in late fall and/or early spring.
	Peach	See Nectarine cluster.	
3AA	**Pear**		Exempt Apply up to a 10-10-100 mixture.
AC	Copper deficiency (exanthema)	10-10-100 (99% Cr) (99% SC/S)	Foliar application. Apply to foliage in early summer.
AG	Pear scab (Venturia)	10-10-100 or 5-5-100 (99% SC/S)	Delayed dormant and foliar application. Apply 10-10-100 in red bud to popcorn and repeat 10 days later or just after petal fall. If leaves are out before second application, apply at 5-5-100.

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
008AA	Pecan		Exempt
DAAU	Crown gall (Agrobacterium)	Bordeaux paste (99% Cr) (99% SC/S)	Wound treatment. After infection has been cut away, disinfect wounds and allow to dry for several days. Then cover the wounds with Bordeaux paste.
05AA	Plum		Exempt
006AA	Prune		Apply up to a 12-12-100 mixture.
APDZ JPDZ AAU	Bacterial canker (gummosis) (Pseudomonas) Crown gall (Agrobacterium)	Bordeaux paste (99% Cr) (99% SC/S)	Wound treatment. After infection has been cut away, disinfect wounds and allow to dry for several days. Then cover the wounds with Bordeaux paste.
		10-10-100 (99% Cr) (99% SC/S)	Dormant application. For bacterial canker and gummosis, apply in late fall (November and December).
MCB ZCEL	Brown rot blossom and twig blight (Monilinia) Shothole (Coryneum blight)	10-10-100 (99% Cr) (99% SC/S) (15-15.1% SC/L, anhydrous) or 12-12-100 (94.3-98% SC/S)	Dormant, delayed dormant, and foliar application. For brown rot, apply when buds begin to swell or in red bud to popcorn, and at petal fall in certain areas. For shothole, apply as dormant spray in late fall and at bud swell.
AAC	Copper deficiency (exanthema)	10-10-100 (99% Cr) (99% SC/S)	Foliar application. Apply to foliage in early summer.

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
13AA	Potato		Exempt Apply up to a 10-10-100 mixture.
AAX PCN	Early blight (Alternaria) Late blight (Phytophthora)	6-8-100 (99% SC/S)	Foliar application. Apply when plants are 4 to 6 inches high. Repeat at 10 to 14 day intervals.
		10-10-100 (99% Cr) (99% SC/S)	Foliar application. Apply at first sign of disease or just before disease usually appears. Repeat at 7 to 9 day intervals for at least 4 to 5 applications.
	Prune	See Plum cluster.	
	Raspberry	See Blackberry cluster.	
16AA	Strawberry		Exempt Apply up to a 4-4-100 mixture.
CO	Leaf spot (Mycosphaerella)	4-4-100 (99% SC/S)	Foliar application.
3DA	Tobacco		N.F.
DZ	Wildfire (Pseudomonas)	6-8-100 [25 gal/100 sq.yd bed] (99% SC/S)	Foliar application to plant beds. Appply immediately after emergence. Apply again 7 to 10 days later. Usually, a third application is made 7 days later.
5AA	Tomato		Exempt Apply up to a 6-8-100 mixture.
AX CN	Early blight (Alternaria) Late blight (Phytophthora)	6-8-100 (99% SC/S)	Foliar application. Apply when plants are first set out. Repeat at 10 to 14 day intervals.
BB	Leaf spot	4-4-100 (98.5% SC/S)	Foliar application.

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
09AA	Walnut		Exempt Apply up to a 15-10-100 mixture and only where Bordeaux mixture has been shown to be non-phytotoxic.
XAA	Bacterial blight (Xanthomonas)	15-10-100 (99% Cr) (99% SC/S) (15-15.1% SC/S, anhydrous)	Delayed dormant application. Apply with 0.5 gallon summer oil emulsion. Apply in early prebloom 10 to 20 percent pistillate (not when catkin blooms are showing) before or after rain.
APDZ	Bacterial canker (gummosis) (Pseudomonas)	Bordeaux paste (99% Cr) (99% SC/S)	Wound treatment. After infection has been cut away, disinfect wounds and allow to dry for several days. Then cover the wounds with Bordeaux paste.
DAAU	Crown gall (Agrobacterium)		
CDCM	Dothiorella dieback (melaxuma)		
APCN	Phytophthora canker (crown rot)		
TRBA	Root rot (Rosellinia)	10-10-100 (99% Cr) (99% SC/S)	Soil and base of tree application. Apply when infection is detected to base and soil around trees.
	Youngberry	See Blackberry cluster.	

ORNAMENTALS

(Ornamental Plants (herbaceous plants and bulbs; woody shrubs, trees and vines))

General Warnings and Limitations: Dosage rates and mixing instructions are as given in AGRICULTURAL CROPS.

065AA 065DA	Chrysanthemum		
057AA 057DA	Flowering Dogwood		
126AA 126DA	Iris		
CQBB	Leaf spots	8-8-100 (98.5% SC/S)	Foliar application. Apply in spring as growth starts. Repeat as needed.

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
21AA 21DA	Hollyhock		
CDP	Anthracnose (Colletotrichum)	4-4-100 (98.5% SC/S)	Foliar application. Apply in spring as growth starts. Repeat as needed.
QBB	Leaf spots		
76AA 76DA	Ivy		
QBB	Leaf spots	4-4-100 (98.5% SC/S)	Foliar application. Apply in spring as growth starts. Repeat as needed.
88AA 88DA	Ligustrum		
93AA 93DA	Oak		
RBA	Root rot (Rosellinia)	10-10-100 (99% Cr) (99% SC/S)	Soil and base of tree application. Apply when infection is detected to base and soil around trees.
97AA 97DA	Palm		
CDP	Anthracnose (Colletotrichum)	4-4-100 (98.5% SC/S)	Foliar application. Apply in spring as growth starts. Repeat as needed.
QBB	Leaf spots		
QBB	Scab		
51AA 51DA	Peonies		
CCV	Leaf blotch (Cladosporium)	4-4-100 (98.5% SC/S)	Foliar application. Apply in spring as growth starts. Repeat as needed.

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COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
	NONCROP AQUATIC AREAS, INDUSTRIAL: COOLING TOWERS, PULP AND PAPER MILLS, ETC.		
018MA 020MA 019MA	Air Washer Water Systems Evaporative Condenser Water System		Air washers should be pre-cleaned, if needed, and the pH adjusted when subject to acidifying materials.
FQBB	Slime-forming fungi	0.062-0.19 lb Cu/1,000 gal system water or 7.4-22 ppm Cu (6.93% RTU, anhydrous)	Water treatment. Initial dose: Apply a slug dose of 0.12 to 0.19 pound (15 to 22 ppm) depending on the condition of the system. Subsequent dose: Apply a slug dose of 0.062 to 0.093 pound (7.4 to 11 ppm) weekly or as needed. If microbial growth is noticed, apply initial slug dose and repeat until control is evident. Upon control, apply subsequent slug dose.
019MA	Commercial and Industrial Water Cooling Tower Systems		Addition may be made in the tower sump, tower basin, or on distribution decks unless specified. Heavy contamination must be removed manually.
FQBB	Slime-forming fungi	0.025-0.051 lb Cu/1,000 gal system water or 3.0-6.1 ppm Cu (20% G)	Water treatment. Initial dose: Apply 0.051 pound (6.1 ppm) to the sump of the cooling tower. Repeat until microbial control is evident. Subsequent dose: Apply 0.025 pound (3.0 ppm) periodically as needed to maintain microbial control. Formulated with sodium pentachlorophenate (and sodium salts of other chlorophenols).
		0.00375-0.0375 lb Cu/1,000 gal system water or 0.45-4.5 ppm Cu (15% RTU)	Water treatment. Add directly to cooling water. Formulated with alkyl*dimethyl benzyl ammonium chloride *alkyl (50% C14, 40% C12, 10% C16).

Refer to Air Washer Water Systems cluster for additional dose and use pattern information.

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
8MA	Pulp and Paper Mill Systems		
BBB	Slime-forming fungi	0.45-1.8 ppm Cu (15% RTU)	Water treatment. Add directly to the mill system or to the fresh water added to the mill system. Formulated with alkyl*dimethyl benzyl ammonium chloride *alkyl (50% C14, 40% C12, 10% C16).
6MA	Sewage Systems		
BB	Fungus growth	0.25-0.5 lb Cu/cloth bag (75% G) (96.9-100% Cr)	Water treatment. For sewer pumps and force mains, place bag in inlet of storage well.
		0.375-1.0 lb Cu/drain (75% G) (96.9-100% Cr)	Water treatment. For storm drains, apply 0.375 to 0.5 pound and use water hose in dry weather to carry formulation to obstruction. If blockage still exists after several hours, apply 0.5 to 1.0 pound. Do not apply during excessive storm flow.
		0.25-0.49 lb Cu/application (75% G) (96.9-100% Cr)	Water treatment. For sewers, add 0.25 pound into each junction or terminal manhole. Repeat every 3 months until flow is free. Add 0.375 to 0.49 pound once a year.
		0.126 lb Cu/application (99% Cr) (15.1% SC/L, anhydrous)	Water treatment. For sewers and storm drains with partial stoppage, flush toward blockage with 5 gallons of water. Repeat at 6 month intervals to prevent blockage. For complete stopage, remove obstruction and apply as above.

See DOMESTIC DWELLINGS, MEDICAL FACILITIES, AND SCHOOLS, Sewage Systems for additional dose and use pattern information.

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
	DOMESTIC DWELLINGS, MEDICAL FACILITIES, AND SCHOOLS		
030A 020A	Grout Seams of Ceramic Tile Stall and Tub Showers		May temporarily cause grout to turn light aqua color.
QBB	Mold/mildew	-- (0.76% RTU, anhydrous)	Surface treatment. Clean tile but not grout seams. Do not use a wax or a wax cleaner. Rinse with water. Pump spray on grout seams. Wipe with a damp cloth before spray dries and rinse with water. Repeat when new growth appears.
26MA	Sewage Systems		Do not pour into sink or tub drains.
QBB	Fungus growth	0.25-1.5 lb Cu/application (75% G) (93.75-100% Cr) or 1.5-3 tbls 99% Cr/application (99% Cr)	Water treatment. Use for house and building connections to street sewers, cesspools, or septic tanks. As a preventative, apply 0.25 to 0.5 pound every 3 to 6 months. For partial stoppage, apply 0.48 to 1.0 pound once. For complete stoppage, apply 1.5 pounds, and, if needed, again in 7 to 10 days; or, apply 1.0 pound weekly for 2 to 3 weeks. Completely stopped lines must be partially opened by use of a sewer rod. To apply, add to toilet bowl nearest sewerline 0.125 pound at a time and flush each time. Addition may also be made through the nearest clean-out plug in basement. Apply in evening before retiring when waste facilities are not being used.

See NONCROP AQUATIC AREAS, INDUSTRIAL: COOLING TOWERS, PULP AND PAPER MILLS, ETC., Sewage Systems for additional dose and use pattern information.

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
	STRUCTURES, WOOD PRODUCTS AND WOOD COMMODITY PRESERVATION		
	(Terrestial Structure Wood Protection)		
000A 00NA 020A 02NA 030A 03NA 04NA 060A 110A	Wood Protection Treatments of Existing Buildings or Parts of Buildings (including bamboo, greenhouses, porch flooring, roof cornices, wood buildings, and wood fences)		Apply to clean, unpainted wood, free of oil or stains. Use on all wood to be in contact with masonry or destined for prolonged exposure to moisture.
3QBB QBB	Mildew Wood decay/rot	0.137 lb Cu/ 200-400 sq.ft rough or dressed lumber (3.84% RTU, anhydrous)	Wood protection treatment. May be applied by brush, spray, or dip. For indoor wood subject to frequent wetting such as occurs from condensation or rain seepage, or comes in direct contact with soil, apply 1 drenching coat. Wood already installed indoors may be treated using adequate ventilation. For outdoor wood, 2 to 3 applications are recommended if the wood is to be exposed to weather or severe moisture. Thoroughly treat all cracks, knot holes, wooden joints, and bolt hole surfaces. One coat may follow another within a few minutes. Dipping for outdoor use should be for a minimum of 12 hours. Where ground or water contact is planned, immersion should be from 24 to 48 hours. Formulated with chromic acid and sodium dichromate.

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
	Wood Protection Treatments of Existing Buildings or Parts of Buildings (continued)		
		0.126 lb Cu/ 200 sq.ft rough lumber or 300 sq.ft dressed lumber, 1 coat (3.5% RTU, anhydrous)	Wood protection treatment. Best results are obtained by immersion for at least 3 to 5 minutes. Wood intended for use in contact with soil should be dipped for a minimum of 3 minutes. If applied by brush or spray, lumber should receive 2 flowing coats. Second or succeeding coats should be applied before previous coat is completely dry. Allow treated surfaces to dry for at least 48 hours before painting, varnishing, or glazing. Formulated with acetic acid and sodium dichromate.
	(Wood Products and Wood Commodities Protection)		
030A 03NA 1 10A	Finished Wood Products (including garage doors, millwork, outdoor furniture, playground equipment, shingles, steps, truck bodies, wood joists, and wood sashes and frames)	--	
020A 02NA	Seasoned Forest Products (including lumber and porch columns)		

Refer to (Terrestial Structure Wood Protection), Wood Protection Treatments of Existing Buildings or Parts of Buildings for dose and use information.

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
1NA	Unseasoned Forest Products (green, peeled posts)		
BB	Wood rot/decay	4.27-4.455 lb Cu/24 gal water (99% Cr) (15.1% SC/L, anhydrous)	Soil contact wood protection treatment. Prepare the copper sulfate solution then prepare a second solution with sodium chromate (18.0 pounds in 26 gallons of water). Soak the green, peeled posts butt end down in the copper sulfate solution for 3 days, then butt end down in the sodium chromate solution for 2 days. Finally, turn the posts upside down in the sodium chromate for 1 additional day. Remove and rinse posts with clear water.
4NA	Wood Containers or Items Used for Growing Plants (flower boxes, trellises)		
		Refer to (Terrestial Structure Wood Protection), Wood Protection Treatments of Existing Buildings or Parts of Buildings for dose and use information.	
00A	Wood Protection Treatment By Pressure (forest products)		
BB	Wood rot/decay	0.064-0.4% Cu water solutions (25.5-32% SC/S)	Wood protection treatment by pressure. Formulated with one or a combination of: arsenic pentoxide, sodium pyroarsenate, potassium dichromate and sodium dichromate.
		0.0105-0.17% Cu water solutions (8.5% SC/L)	Wood protection treatment by pressure. Apply only using vaccum-pressure impregnation. Dilute with water to concentration needed for final retention desired. Either kiln dry after treatment or allow 1 week between impregnation and installation of treated wood for fixation of preservative. Impregnation procedures must rigidly adhere to current AWPA Standards. Formulated with arsenic acid and sodium dichromate.

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations

(Aquatic and Marine Structure Protection)

0060A Wood Boats

Refer to (Terrestial Structure Wood Protection), Wood Protection Treatments of Existing Buildings or Parts of Buildings for dose and use information.

Listing of Registered Pesticide Products by Formulation

15% (metallic Cu: 0.58 lb/gal or 6%)* technical chemical
copper sulfate anhydrous (024401)
010103-00010**
*copper sulfate pentahydrate equivalent: 2.3 lb/gal
**also listed as soluble concentrate/liquid

99% (metallic Cu: 25.2%) technical chemical
copper sulfate pentahydrate (024401)
000226-00004 000550-00066 001109-00001 001109-00007
001109-00019 001109-00021 001109-00027 001109-00032
001278-00005 008901-00006 009905-00001 035896-00003
039295-00003

99.5% (metallic Cu: 25.2%) technical chemical
copper sulfate pentahydrate (024401)
011435-00001 046218-00001

50% formulation intermediate
copper sulfate pentahydrate (024401), chromic acetate (021102) plus potassium dichromate (068302)
003992-00006

20% (metallic Cu: 5.09%) granular
copper sulfate pentahydrate (024401) plus sodium pentachlorophenate (and sodium salts of other chlorophenols) (063003)
003682-00029

75% (metallic Cu: 18.75%) granular
copper sulfate pentahydrate (024401)
005605-00173*
*metallic copper inferred

93.75% (metallic Cu: 23.44%) crystalline
copper sulfate pentahydrate (024401)
009283-00001*
*metallic copper inferred

96.5% (metallic Cu: 24.125%) crystalline
copper sulfate pentahydrate (024401)
000192-00077*
*metallic copper inferred

96.9% (metallic Cu: 24.6%) crystalline
copper sulfate pentahydrate (024401)
007687-00001

99% (metallic Cu: 25%) crystalline
copper sulfate pentahydrate (024401)
017106-00001* 039295-00008
*metallic copper inferred

Listing of Registered Pesticide Products by Formulation (continued)

99% (metallic Cu: 25.2%) crystalline
copper sulfate pentahydrate (024401)
002105-00008 003286-00030 007401-00326 007792-00001
010267-00001 045450-00001

99.41% (metallic Cu: 25%) crystalline
copper sulfate pentahydrate (024401)
033855-00001*
*metallic copper inferred

100% (metallic Cu: 25%) crystalline
copper sulfate pentahydrate (024401)
000427-00048* 010906-00001
*metallic copper inferred

25.5% (metallic Cu: 6.375%) soluble concentrate/solid
copper sulfate pentahydrate (024401), arsenic pentoxide (006802) plus sodium dichromate (068304)**
000061-00140*
*metallic copper inferred
**AWPA Standard P5: CCA, Type C

26.8% (metallic Cu: 6.7%) soluble concentrate/solid
copper sulfate pentahydrate (024401), arsenic pentoxide (006802), sodium pyroarsenate (013401) plus sodium dichromate (068304)**
000061-00139*
*metallic copper inferred
**AWPA Standard P5: CCA, Type B

32% (metallic Cu: 8%) soluble concentrate/solid
copper sulfate pentahydrate (024401), arsenic pentoxide (006802) plus potassium dichromate (068302)**
000061-00127*
*metallic copper inferred
**AWPA Standard P5: CCA, Type A

37.7% (metallic Cu: 9.5%) soluble concentrate/solid
copper sulfate pentahydrate (024401)
004833-00006 020004-00004

94.3% (metallic Cu: 24%) soluble concentrate/solid
copper sulfate pentahydrate (024401)
000279-00505 010103-00001

98% (metallic Cu: 24.96%) soluble concentrate/solid
copper sulfate pentahydrate (024401)
000279-00108

Listing of Registered Pesticide Products by Formulation (continued)

98.5% (metallic Cu: 25%) soluble concentrate/solid
copper sulfate pentahydrate (024401)
000140-00041*
*metallic copper inferred

99% (metallic Cu: 25.2%) soluble concentrate/solid
copper sulfate pentahydrate (024401)
000239-00057 001386-00304 001388-00023 001772-00086
002105-00007 002105-00009 045450-00002

8.5% (metallic Cu: 0.208 lb/gal or 2.1%) soluble concentrate/liquid
copper sulfate pentahydrate (024401), arsenic acid (006801) plus sodium dichromate (068304)*
045968-00004
*AWPA Standard P5: CCA, Type A

15% (metallic Cu: 0.58 lb/gal or 6%)* soluble concentrate/liquid
copper sulfate anhydrous (024401)
010103-00010**
*copper sulfate pentahydrate equivalent: 2.3 lb/gal
**also listed as technical chemical

15.1% (metallic Cu: 0.59 lb/gal or 6%)* soluble concentrate/liquid
copper sulfate anhydrous (024401)
038539-00002
*copper sulfate pentahydrate equivalent: 2.31 lb/gal

15.1% (metallic Cu: 0.636 lb/gal or 6%)* soluble concentrate/liquid
copper sulfate anhydrous (024401)
045450-00004**
*copper sulfate pentahydrate equivalent: 2.5 lb/gal
**metallic copper inferred

0.76% liquid-ready to use
copper sulfate anhydrous (024401)
019214-00002

3.84% (metallic Cu: 0.137 lb/gal or 1.527%) liquid-ready to use
copper sulfate anhydrous (024401), chromic acid (021101) plus sodium dichromate (068304)*
003992-00001 007754-00022
*AWPA Standard P5: ACC

3.5% (metallic Cu: 0.126 lb/gal or 1.4%) liquid-ready to use
copper sulfate anhydrous (024401), acetic acid (044001) plus sodium dichromate (068304)*
008300-00007
*AWPA Standard P5: ACC

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

Listing of Registered Pesticide Products by Formulation (continued)

6.93% (metallic Cu: 0.248 lb/gal or 2.76%) liquid-ready to use
copper sulfate anhydrous (024401)
010867-00006*
*metallic copper inferred

15% (metallic Cu: 3.75%) liquid-ready to use
copper sulfate pentahydrate (024401) plus alkyl*dimethyl benzyl ammonium chloride *alkyl (50% C14, 40% C12, 10% C16) (069105)
003876-00051* 003876-00059*
*metallic copper inferred

999 State Label Registrations

CA Reg. No.
000239-04192 001202-05014

TX Reg. No.
003286-08093

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

AGRICULTURAL CROPS

001AA **Almond**
000279-00108 000279-00505 001388-00023 010103-00001
010103-00010 038539-00002 039295-00008 045450-00001
045450-00002 045450-00004

001AA **Apple**
002105-00007 002105-00008 002105-00009

01AA **Apricot**
000239-00057 000279-00108 000279-00505 001386-00304
001388-00023 010103-00001 010103-00010 038539-00002
039295-00008 045450-00001 045450-00002 045450-00004

02AA **Blackberry**
002105-00007 002105-00008 002105-00009

73AA **Carrots**
002105-00007 002105-00008 002105-00009

03AA **Celery**
000140-00041 002105-00007 002105-00008 002105-00009

02AA **Cherry**
001386-00304 001388-00023 002105-00007 002105-00008
002105-00009 010103-00001 010103-00010 038539-00002
039295-00008 045450-00001 045450-00002 045450-00004

00AA **Citrus Fruits**
000279-00505 004833-00006 020004-00004

(lemon, orange, grapefruit)
000140-00041 010103-00010 038539-00002 039295-00008
045450-00001 045450-00002 045450-00004

00AA **Curcurbits**
002105-00007 002105-00008 002105-00009

01AA **Eggplant**
002105-00007 002105-00008 002105-00009

05AA **Loganberry**
002105-00007 002105-00008 002105-00009

03AA **Nectarine**
000239-00057 001386-00304 001388-00023 002105-00007
002105-00008 002105-00009 010103-00001 039295-00008
045450-00001 045450-00002

7.

EPA Index to Pesticide Chemicals

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

Appendix B

Listing of Registration Numbers By Site

AGRICULTURAL CROPS

001AA **Almond**
000279-00108 000279-00505 001388-00023 010103-00001
010103-00010 038539-00002 039295-00008 045450-00001
045450-00002 045450-00004

001AA **Apple**
002105-00007 002105-00008 002105-00009

001AA **Apricot**
000239-00057 000279-00108 000279-00505 001386-00304
001388-00023 010103-00001 010103-00010 038539-00002
039295-00008 045450-00001 045450-00002 045450-00004

002AA **Blackberry**
002105-00007 002105-00008 002105-00009

073AA **Carrots**
002105-00007 002105-00008 002105-00009

003AA **Celery**
000140-00041 002105-00007 002105-00008 002105-00009

002AA **Cherry**
001386-00304 001388-00023 002105-00007 002105-00008
002105-00009 010103-00001 010103-00010 038539-00002
039295-00008 045450-00001 045450-00002 045450-00004

000AA **Citrus Fruits**
000279-00505 004833-00006 020004-00004

(lemon, orange, grapefruit)
000140-00041 010103-00010 038539-00002 039295-00008
045450-00001 045450-00002 045450-00004

000AA **Curcurbits**
002105-00007 002105-00008 002105-00009

001AA **Eggplant**
002105-00007 002105-00008 002105-00009

005AA **Loganberry**
002105-00007 002105-00008 002105-00009

003AA **Nectarine**
000239-00057 001386-00304 001388-00023 002105-00007
002105-00008 002105-00009 010103-00001 039295-00008
045450-00001 045450-00002

Appendix B

Listing of Registration Numbers By Site (continued)

4AA Peach
000239-00057 000279-00108 000279-00505 001386-00304
001388-00023 002105-00007 002105-00008 002105-00009
010103-00001 039295-00008 045450-00001 045450-00002

3AA Pear
000239-00057 002105-00007 002105-00008 002105-00009

8AA Pecan
002105-00007 002105-00008 002105-00009

5AA Plum
000239-00057 000279-00108 000279-00505 001386-00304
001388-00023 002105-00007 002105-00008 002105-00009
010103-00010 038539-00002 039295-00008 045450-00001
045450-00002 045450-00004

3AA Potato
001772-00086 002105-00007 002105-00008 002105-00009

6AA Prune
000279-00108 000279-00505 001386-00304 001388-00023
010103-00010 038539-00002 039295-00008 045450-00001
045450-00002 045450-00004

6AA Raspberry
002105-00007 002105-00008 002105-00009

6AA Strawberry
000140-00041

3DA Tobacco
001386-00304

5AA Tomato
000140-00041 001772-00086

9AA Walnut
002105-00007 002105-00008 002105-00009 010103-00010
038539-00002 039295-00008 045450-00001 045450-00002
045450-00004

7AA Youngberry
002105-00007 002105-00008 002105-00009

Listing of Registration Numbers By Site (continued)

ORNAMENTALS

(Ornamental Plants (herbaceous plants and bulbs; woody shrubs, trees and vines))

65AA Chrysanthemum
65DA

000140-00041

57AA Flowering Dogwood
57DA

000140-00041

21AA Hollyhock
21DA

000140-00041

26AA Iris
26DA

000140-00041

76AA Ivy
76DA

000140-00041

88AA Ligustrum
88DA

002105-00007 002105-00008 002105-00009

93AA Oak
93DA

002105-00007 002105-00008 002105-00009

97AA Palm
97DA

000140-00041

51AA Peonies
51DA

000140-00041

NONCROP AQUATIC AREAS, INDUSTRIAL: COOLING TOWERS, PULP AND PAPER MILLS, ETC.

8MA Air Washer Water Systems
010867-00006

Listing of Registration Numbers By Site (continued)

19MA **Commercial and Industrial Water Cooling Tower Systems**
003682-00029 003876-00059 010867-00006

20MA
19MA **Evaporative Condenser Water System**
010867-00006

08MA **Pulp and Paper Mill Systems**
003876-00051

26MA **Sewage Systems**
000427-00048 005605-00173 007687-00001 010906-00001
033855-00001 045450-00001 045450-00002 045450-00004

DOMESTIC DWELLINGS, MEDICAL FACILITIES, AND SCHOOLS

030A
020A **Grout Seams of Ceramic Tile Stall and Tub Showers**
019214-00002

26MA **Sewage Systems**
000192-00077 000427-00048 003286-00030 005605-00173
007401-00326 007687-00001 007792-00001 009283-00001
010267-00001 010906-00001 017106-00001 033855-00001

STRUCTURES, WOOD PRODUCTS AND WOOD COMMODITY PRESERVATION

(Terrestial Structure Wood Protection)

00A
0NA **Wood Protection Treatments of Existing Buildings or Parts of Buildings**
003992-00001 007754-00022 008300-00007

(Wood Products and Wood Commodities Protection)

30A
3NA **Finished Wood Products**
003992-00001 007754-00022 008300-00007

20A
2NA **Seasoned Forest Products**
003992-00001 007754-00022 008300-00007

Listing of Registration Numbers By Site (continued)

001NA	Unseasoned Forest Products (green, peeled posts) 038539-00002 039295-00008 045450-00001 045450-00002 045450-00004
004NA	Wood Containers or Items Used for Growing Plants 003992-00001 007754-00022
0100A	Wood Protection Treatment By Pressure (forest products) 000061-00127 000061-00139 000061-00140 045968-00004
	(Aquatic and Marine Structure Protection)
0060A	Wood Boats 003992-00001 007754-00022

EPA Index to Pesticide Chemicals

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

Ancillary Documentation

CFR 180.1001 Exemptions from requirement for tolerances

Reg. No. 10867-6 came from the copper sulfate monohydrate (024402) Product Search Listing.

The following labels would appear to be more appropriately coded as basic copper sulfate (008101):
001258-01034 001386-00099 002217-00613 019713-00081
035896-00004 048391-00013 006973-03596 009859-09138
009859-09140.
These labels have not been entered in this report, but will be added to an existing basic copper sulfate report.

Reg. No. 46946-166 would appear to be more appropriately coded as copper (as metallic from cuprous and cupric oxide) (042403).

Reg. No. 10965-9875 is CA variance and has not been entered.

Reg. No's 5870-14 and 5870-15 (for use in soft drink dispensers) were left out of the report as directd by D. Hansen due to questions about the pest claim, % a.i, and dosage.

A listing of those products with copper sulfate anhydrous, and those with metallic copper inferred (reluctantly calculated at only 25%) can be found on the following ancillary page.

Note also that 3876-51 and 38786-59 are liquid products with the % copper sulfate as pentahydrate.

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

Ancillary Documentation

Listing of Registered Pesticide Products

000061-00127 000061-00139 000061-00140 000140-00041
000192-00077 000226-00004 000239-00057 000279-00108
000279-00505 000427-00048 000550-00066 001109-00001
001109-00007 001109-00019 001109-00021 001109-00027
001109-00032 001278-00005 001386-00304 001388-00023
001772-00086 002105-00007 002105-00008 002105-00009
003286-00030 003682-00029 003876-00051 003876-00059
003992-00001 003992-00006 004833-00006 005605-00173
005870-00014 005870-00015 007401-00326 007687-00001
007754-00022 007792-00001 008300-00007 008901-00006
009283-00001 009905-00001 010103-00001 010103-00010
010267-00001 010867-00006 010906-00001 011435-00001
017106-00001 019214-00002 020004-00004 033855-00001
035896-00003 038539-00002 039295-00003 039295-00008
045450-00001 045450-00002 045450-00004 045968-00004
046218-00001

Listing of Registered Pesticide Products
*metallic copper inferred

000061-00127* 000061-00139* 000061-00140* 000140-00041*
000192-00077* 000427-00048* 003876-00051* 003876-00059*
005605-00173* 009283-00001* 010867-00006* 017106-00001*
033855-00001* 045450-00004*

Listing of Registered Pesticide Products
copper sulfate anhydrous

003992-00001 007754-00022 008300-00007 010103-00010
010103-00010 010867-00006 019214-00002 038539-00002
045450-00004

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

Ancillary Documentation

Listing of Registered Pesticide Products
AWPA Standard P5's

25.5% (metallic Cu: 6.375%) soluble concentrate/solid
copper sulfate pentahydrate (024401), arsenic pentoxide (006802) plus sodium dichromate (068304)
000061-00140
AWPA Standard P5: CCA, Type C

26.8% (metallic Cu: 6.7%) soluble concentrate/solid
copper sulfate pentahydrate (024401), arsenic pentoxide (006802), sodium pyroarsenate (013401) plus sodium dichromate (068304)
000061-00139
AWPA Standard P5: CCA, Type B

32% (metallic Cu: 8%) soluble concentrate/solid
copper sulfate pentahydrate (024401), arsenic pentoxide (006802) plus potassium dichromate (068302)
000061-00127
AWPA Standard P5: CCA, Type A

8.5% (metallic Cu: 0.208 lb/gal or 2.1%) soluble concentrate/liquid
copper sulfate pentahydrate (024401), arsenic acid (006801) plus sodium dichromate (068304)
045968-00004
AWPA Standard P5: CCA, Type A

3.84% (metallic Cu: 0.137 lb/gal or 1.527%) liquid-ready to use
copper sulfate anhydrous (024401), chromic acid (021101) plus sodium dichromate (068304)
003992-00001   007754-00022
AWPA Standard P5: ACC

3.5% (metallic Cu: 0.126 lb/gal or 1.4%) liquid-ready to use
copper sulfate anhydrous (024401), acetic acid (044001) plus sodium dichromate (068304)
008300-00007
AWPA Standard P5: ACC

NAC
II/3AI
01

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)* **

TYPE PESTICIDE: Molluscicide (Also refer to Fungicide and Herbicide entries)

FORMULATIONS:
Tech (99.5%)
Cr (99%, 99.5%)
SC/L (15.1%)
RTU (3.8%)

GENERAL WARNINGS AND LIMITATIONS:

Agricultural and Livestock Tolerances:

Copper is exempted from the requirements of a tolerance in eggs, fish, meat, milk, irrigated crops, and shellfish when it results from the use of copper sulfate as an algaecide or herbicide in irrigation conveyance systems and lakes, ponds, reservoirs, or bodies of water in which fish or shellfish are cultivated.

Dosages and concentrations have been calculated for copper as elemental. Concentrations and dosages are given for metallic copper (Cu) with the associated formulations in percent copper sulfate (pentahydrate or anhydrous). For copper sulfate pentahydrate labels that do not give the percentage of metallic copper, a metallic content of 25 percent of the active ingredient was inferred for the purpose of calculating dosages. For similar copper sulfate anhydrous labels, a metallic content of 39.81 percent of the active ingredient was inferred. Refer to the formulation pages for the percent or pounds per gallon of metallic copper and the percent of copper sulfate or anhydrous copper sulfate for each registration.

Definitions of Terms:

**Copper Sulfate (Pentahydrate And Anhydrous) is the name chosen to present the active ingredient in this report. This name does not appear in either Acceptable Common Names and Chemical Names for the Ingredient Statements of Pesticide Labels or Active Chemical Code List (Shaughnessy). It was chosen to best represent the approved labeling and chemical constitution. The use of this name will be confined to this report unless otherwise noted in future reports.

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*copper sulphate
copper sulfate pentahydrate
Bluestone

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
	NONCROP AQUATIC AREAS		
23MA	Aquaria (fresh water)		Remove fuzzy (fine leaf) plants such as foxtail (*Myriophyllum verticillatum*) and clean with lime water.
ABA	Snails	— (3.8% RTU) or 0.0545 oz Cu/ 4 oz water [1 drop/gal aquarium water] (99% Cr)	Water treatment. Add 1 drop of solution per gallon of aquarium water and repeat the following day. Thereafter, add 1 drop in each corner after changing water, or 1 drop where a snail appears.
		0.0545 oz Cu/ 4 oz water [10 drops/ gal dipping solution] (99% Cr)	Net bath. Bathe net 2 minutes followed by rinse.

	Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
MA	Artificially Impounded Waters (including farm ponds)		1 ppm (potable water) Exempt (see Agricultural and Livestock Tolerance statement) Fish Caution: Should treatment occur under conditions of a heavy algae infestation, in order to avoid suffocation of fish due to lack of oxygen caused by the decaying vegetation, never treat more than one-third to one-half of the lake or pond at a time. Allow sufficient time between treatments for oxygen levels to recover (approximately 7 to 21 days). If fish are present and the alkalinity of the water is less than 50 parts per million as calcium carbonate, treat one-third to one-half of the lake or pond at a time. Allow 7 to 14 days between treatments. Trout and other species of fish may be killed, especially in soft and acid water. Consult local department of fish and game before applying copper sulfate (pentahydrate) in public waters.
ZA	Host snails of swimmers itch	0.5-1.25 ppm Cu [moderately hard water] or 1.25-2.5 ppm Cu [very hard water with alkalinity greater than 200 ppm] (99.5% Cr)	Water application. Apply on calm, sunny afternoons when water temperature is above 60 F (15.6 C). Dissolve and distribute over entire pond, pools, and tributaries. Apply as a uniform surface spray. Keep swimmers and livestock away from the water for 5 days following treatment; doubling this period in very soft waters.
AA	Leeches	1.25 ppm Cu [moderately hard water] (99.5% Cr)	

Site and Pest	Dosages and Formulation(s)	Tolerance, Use, Limitations
AERIAL, MOTHPROOFING AND TANK MIX APPLICATIONS		
500 AAA Aerial Application		
—	Refer to AGRICULTURAL CROPS Rice	

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

Listing of Registered Pesticide Products by Formulation

99.5% (metallic Cu: 25.2%) technical chemical
copper sulfate pentahydrate (024401)
011435-00001

99% (metallic Cu: 25.2%) crystalline
copper sulfate pentahydrate (024401)
001109-00032 001278-00008 008901-00021 010103-00005
041988-00001 045450-00001 045450-00002

99.5% (metallic Cu: 25.2%) crystalline
copper sulfate pentahydrate (024401)
011435-00002 046218-00002

15.1% (metallic Cu: 0.59 lb/gal or 6%) soluble concentrate/liquid
copper sulfate anhydrous (024401)
045450-00004

3.8% (metallic Cu: 0.95%) liquid ready-to-use
copper sulfate pentahydrate (024401)
008999-00003

999 State Label Registrations

CA Reg. No.
010965-09875

MI Reg. No.
000595-04553 000635-08183 010183-08855

MN Reg. No.
001109-04655

WI Reg. No.
001109-04656

COPPER SULFATE (PENTAHYDRATE AND ANHYDROUS)

Appendix B

Listing of Registration Numbers By Site

AGRICULTURAL CROPS

72AA Rice

001109-00032 001278-00008 008901-00021 010103-00005
045450-00001 045450-00002 045450-00004

NONCROP AQUATIC AREAS

23MA Aquaria (fresh water)

008999-00003 041988-00001

31MA Artificially Impounded Waters (including farm ponds)

011435-00002 046218-00002

Guide to Use of This Bibliography

1. CONTENT OF BIBLIOGRAPHY. This bibliography contains citations of all studies considered relevant by EPA in arriving at the positions and conclusions stated elsewhere in the Standard. Primary sources for studies in this bibliography have been the body of data submitted to EPA and its predecessor agencies in support of past regulatory decisions. Selections from other sources including the published literature, in those instances where they have been considered, will be included.

2. UNITS OF ENTRY. The unit of entry in this bibliography is called a "study." In the case of published materials, this corresponds closely to an article. In the case of unpublished materials submitted to the Agency, the Agency has sought to identify documents at a level parallel to the published article from within the typically larger volumes in which they were submitted. The resulting "studies" generally have a distinct title (or at least a single subject), can stand alone for purposes of review, and can be described with a conventional bibliographic citation. The Agency has attempted also to unite basic documents and commentaries upon them, treating them as a single study.

3. IDENTIFICATION OF ENTRIES. The entries in this bibliography are sorted numerically by "Master Record Identifier," or MRID, number. This number is unique to the citation, and should be used at any time specific reference is required. It is not related to the six-digit "Accession Number" which has been used to identify volumes of submitted studies; see paragraph 4(d)(4) below for a further explanation. In a few cases, entries added to the bibliography late in the review may be preceded by a nine-character temporary identifier. These entries are listed after all MRID entries. This temporary identifier number is also to be used whenever specific reference is needed.

4. FORM OF ENTRY. In addition to the Master Record Identifier (MRID), each entry consists of a citation containing standard elements followed, in the case of material submitted to EPA, by a description of the earliest known submission. Bibliographic conventions used reflect the standards of the American National Standards Institute (ANSI), expanded to provide for certain special needs.

a. Author. Whenever the Agency could confidently identify one, the Agency has chosen to show a personal author. When no individual was identified, the Agency has shown an identifiable laboratory or testing facility as author. As a last resort, the Agency has shown the first submitter as author.

b. Document Date. When the date appears as four digits with no question marks, the Agency took it directly from the document. When a four-digit date is followed by a question mark, the bibliographer deduced the date from evidence in the document. When the date appears as (19??), the Agency was unable to determine or estimate the date of the document.

c. Title. In some cases, it has been necessary for Agency bibliographers to create or enhance a document title. Any such editorial insertions are contained between square brackets.

d. Trailing Parentheses. For studies submitted to the Agency in the past, the trailing parentheses include (in addition to any self-explanatory text) the following elements describing the earliest known submission:

   (1) Submission Date. The date of the earliest known submission appears immediately following the word "received."

   (2) Administrative Number. The next element, immediately following the word "under," is the registration number, experimental use permit number, petition number, or other administrative number associated with the earliest known submission.

   (3) Submitter. The third element is the submitter, following the phrase "submitted by." When authorship is defaulted to the submitter, this element is omitted.

   (4) Volume Identification (Accession Numbers). The final element in the trailing parentheses identifies the EPA accession number of the volume in which the original submission of the study appears. The six-digit accession number follows the symbol "CDL," standing for "Company Data Library." This accession number is in turn followed by an alphabetic suffix which shows the relative position of the study within the volume. For example, within accession number 123456, the first study would be 123456-A; the second, 123456-B; the 26th, 123456-Z; and the 27th, 123456-AA.

OFFICE OF PESTICIDE PROGRAMS
REGISTRATION STANDARD BIBLIOGRAPHY
Citations Considered to be Part of the Data Base Supporting Registrations Under the Copper Sulfate Standard

MRID	CITATION
00001999	Atkins, L., Jr.; Anderson, L.D. (1967) Toxicity of Pesticides and Other Agricultural Chemicals to Honey Bees: Laboratory Studies. (Unpublished study received Jan 30, 1969 under 9G0802; prepared by Univ. of California--Riverside, Dept. of Entomology, submitted by Hercules, Inc., Agricultural Chemicals, Wilmington, Del.; CDL:093111-D)
00047460	WARF Institute, Incorporated (1973) Report: WARF No. 2040242, 2040243, 2040244. (Compilation; unpublished study received Mar 30, 1973 under unknown admin. no.; submitted by Kocide Chemical Corp., Houston, Tex.; CDL:132472-A)
00056781	Vedder, D.L. (1970) Fish Toxicity. (Unpublished study received Sep 16, 1970 under 8959-1; prepared by Marine Biochemists, Inc., submitted by Applied Biochemists, Inc., Mequon, Wis.; CDL: 100318-C)
00062068	Scheinberg, I.H.; Sternlieb, I. (1960) Copper Metabolism. Pharmacological Reviews 12:355-381. (Also in unpublished submission received Aug 25, 1976 under 39752-1; submitted by Canadian Metafina Chemicals, New Westminster, Br. Columbia; CDL:228175-C)
00062069	Schroeder, H.A.; Nason, A.P.; Tipton, I.H.; et al. (1966) Essential trace metals in man: Copper. Journal of Chronic Diseases 19: 1007-1034. (Also in unpublished submission received Aug 25, 1976 under 37952-1; submitted by Canadian Metafina Chemicals, New Westminster, British Columbia; CDL:228175-D)
00065678	Cities Service Company (1965?) General Chemistry: Copper Sulfate Monohydrate. (Unpublished study received Jun 20, 1977 under 1109-33; CDL:230760-A)
00067454	Piccirillo, V.J. (1977) Final Report: Subacute Dietary LC50 Study in Mallard Ducks: Project No. 811-106. (Unpublished study received Jul 11, 1977 under 1109-7; prepared by Hazleton Laboratories America, Inc., submitted by Cities Service Co., Atlanta, Ga.; CDL:230839-A)
00067455	Bodden, R. (1978) Report: WARF Institute No. 7020979. (Unpublished study received Jun 12, 1978 under 1109-7; prepared by WARF Institute, Inc., submitted by Cities Service Co., Atlanta, Ga.; CDL:230839-B)
00067456	WARF Institute, Incorporated (1977) Report: WARF Institute No. 7020979. (Unpublished study received Jul 11, 1977 under 1109-7; submitted by Cities Service Co., Atlanta, Ga.; CDL: 230839-C)
00070287	Richelsen Chemical Company (1976) Copper Sulfate Pentahydrate: Fate of Copper in the Environment. Summary of studies 231553-B, and 231553-D through 231553-F. (Unpublished study received Sep 13, 1977 under 41071-1; CDL:231553-A)

OFFICE OF PESTICIDE PROGRAMS
REGISTRATION STANDARD BIBLIOGRAPHY
Citations Considered to be Part of the Data Base Supporting Registrations Under the Copper Sulfate Standard

MRID	CITATION
00070288	U.S. Bureau of Sport Fisheries and Wildlife (1974) A Review of the Literature on the Use of Copper Sulfate in Fisheries. N.P. (PB-235 445; pp. 20, 41, 58, 59 only; available from: National Technical Information Service, Springfield, VA; published study; CDL:231553-B)
00085289	Marshall, B.L. (1975) Final Report: Acute Bioassay on Shrimp (Palaemonetes Vulgaris). (Unpublished study received Mar 6 1975 under 1109-19; prepared by Marine Research Institute, submitted by Cities Service Co., Atlanta, Ga.; CDL:110616-A)
00099168	Vedder, D.L. (1970) Fish toxicity: [Cutrine]. (Unpublished study received Sep 16, 1970 under 8959-1; prepared by Marine Biochemists, Inc., submitted by Applied Biochemists, Inc., Mequon, Wis.; CDL:005661-F)
00099255	Phelps Dodge Refining Company (1962?) Full Reports of Investigations Made with Safety of the Pesticide Chemical: [Copper Sulfate as an Algicide]. (Unpublished study received Nov 17, 1970 under 1F1093; CDL:090853-A)
00099256	Claypole, G. (19??) Careful Use of Chemicals Controls Lake Weeds and Algae. N.P. (Also in unpublished submission received Nov 17, 1970 under 1F1093; submitted by Phelps Dodge Refining Co., New York, N.Y.; CDL:090853-B)
00099257	Anthony, S.S. (1969) Algae Handled Efficiently by Augusta Water District. Water & Sewage Works (May) ? (Also in unpublished submission received Nov 17, 1970 under 1F1093; submitted by Phelps Dodge Refining Co., New York, N.Y.; CDL:090853-C)
00099258	Anon. (1965) New ways to apply aquatic herbicides. Weeds, Trees and Turf ?(Feb/Apr):? (Also in unpublished submission received Nov 17, 1970 under 1F1093; submitted by Phelps Dodge Refining Co., New York, N.Y.; CDL:090853-D)
00099259	Bennett, D.G. (1967) Aquatic weed control becomes technical Operation. Weeds, Trees and Turf ?(May):? (Also in unpublished submission received Nov 17, 1970 under 1F1093; submitted by Phelps Dodge Refining Co., New York, N.Y.; CDL:090853-E)
00099260	Toth, S.J.; Riemer, D.N. (19??) Algae control in farm ponds: Are present dosage rates of copper sulphate always adequate. [Without title]?:? (Also in unpublished submission received Nov 17, 1970 under 1F1093; submitted by Phelps Dodge Refining Co., New York, N.Y.; CDL:090853-F)

OFFICE OF PESTICIDE PROGRAMS
REGISTRATION STANDARD BIBLIOGRAPHY
Citations Considered to be Part of the Data Base Supporting
Registrations Under the Copper Sulfate Standard

MRID	CITATION
00099262	Riemer, D.N.; Toth, S.J. (1970) Adsorption of copper by clay minerals, humic acid and bottom muds. Journal of American Water Works Association 62(3):195-197. (Also in unpublished submission received Nov 17, 1970 under 1F1093; submitted by Phelps Dodge Refining Co., New York, N.Y.; CDL:090853-H)
00099263	Toth, S.J.; Riemer, D.N. (1968) Precise chemical control of algae in ponds. Journal of American Water Works Association 60(3): 367-371. (Also in unpublished submission received Nov 17, 1970 under 1F1093; submitted by Phelps Dodge Refining Co., New York, N.Y.; CDL:090853-I)
00099269	Agway, Incorporated (1971) [Efficacy of Various Compounds for Drying Onion Foliage and Regulating Harvest Time]. (Compilation; unpublished study received Jul 20, 1972 under 2F1226; CDL: 091056-A)
00099281	Markey, J.W. (1970) Letter sent to Lee Terbush dated Dec 14, 1970: Petition on copper sulfate in water—additional information on inerts. (Unpublished study received Nov 24, 1970 under 1F1073; submitted by Cities Service Co., Atlanta, Ga.; CDL:093383-A)
00099282	Hale, F.E. (1942) The Use of Copper Sulfate in Control of Microscopic Organisms. New York, N.Y.: Phelps Dodge Refining Corp. (Also in unpublished submission received Nov 24, 1970 under 1F1073; submitted by Cities Service Co., Atlanta, Ga.; CDL: 093383-B)
00099284	Armstrong, E.L. (19??) Undated letter sent to Joseph G. Cummings [Copper sulfate pentahydrate to control algae and aquatic weeds]. (U.S. Dept. of the Interior, Bureau of Reclamation; unpublished study; CDL:093383-E)
00099288	Stauffer Chemical Company (1970?) Sutan(R): Environmental Studies. Summary of studies 097089-B through 097089-G. (Unpublished study received on unknown date under 1F1042; CDL: 097089-A)
✓ 00099374	McCann, J.A. (1971) [Humco Copper Sulfate: Bluegill (Lepomis macrochirus)]: Test No. 366. (U.S. Agricultural Research Service, Pesticides Regulation Div., Animal Biology Laboratory; unpublished study; CDL:130336-A)
00099522	Timuss, D. (1975) Laboratory Analysis: [Copper Sulfate]: File No. 9206A. (Unpublished study received Apr 23, 1976 under 37952-1; prepared by Can Test Ltd., Canada, submitted by Canadian Metafina Chemicals, New Westminster, BC; CDL:228172-B)

OFFICE OF PESTICIDE PROGRAMS
REGISTRATION STANDARD BIBLIOGRAPHY
Citations Considered to be Part of the Data Base Supporting Registrations Under the Copper Sulfate Standard

MRID	CITATION
00099537	Mereniuk, G.; Medzhibovskaia, Z. (1970) The contamination of soil and fruit by copper-containing peticides. Gigiena i Sanit. 35 (1):108-10. Taken from: Health Aspects of Pesticides Abstract Bulletin 3:445. (U.S. Dept. of Health, Education and Welfare generated; abstract 70-1590; published study; CDL:228173-Q)
00099551	Wilbur Ellis Co. (19??) [Ingredients, Composition and Manufacturing Process of Copper Sulphate Pentahydrate]. (Unpublished study received May 31, 1978 under 2935-412; CDL:234177-A)
00099556	WARF Institute, Inc. (1978) Report: WARF Institute No. 8031062-1065. (Unpublished study received Jul 12, 1978 under 7368-28; submitted by Georgia-Pacific Corp., Newport Beach, CA; CDL: 234404-A)
00099558	LeBlanc, G.; Surprenant, D. (1978) Acute Toxicity of Copper Sulfate Granular Crystals to the Water Flea (Daphnia magna): Report No. BW-78-7-211. (Unpublished study received Aug 22, 1978 under 1109-20; prepared by EG & G, Bionomics, submitted by Cities Service Co., Atlanta, GA; CDL:234664-A)
00099559	Heitmuller, T. (1978) Toxicity of Cities Service Company's Copper Sulfate (pentahydrate) to Pink Shrimp (Penaeus duorarum): Report No. BP-78-8-109. (Unpublished study received Aug 22, 1978 under 1109-20; prepared by EG & G, Bionomics, submitted by Cities Service Co., Atlanta, GA; CDL:234664-B)
00099561	Hollister, T. (1978) Toxicity of Copper Sulfate (pentahydrate) to Embryos of Eastern Oysters (Crassostrea virginica): Report No. BP-78-8-108. (Unpublished study received Aug 22, 1978 under 1109-20; prepared by EG & G, Bionomics, submitted by Cities Service Co., Atlanta, GA; CDL:234664-D)
00106119	Piccirillo, V. (1977) Final Report: Subacute Dietary LC50 Study in Bobwhite Quail: Project No. 811-105. (Unpublished study received May 23, 1977 under 1109-7; prepared by Hazleton Laboratories America, Inc., submitted by Cities Service Co., Atlanta, GA; CDL:230244-A)

APPENDIX II- 3

OMB Approval No. 2000-0468 (Expires 12-31-83)

FIFRA SECTION 3(C)(2)(B) SUMMARY SHEET

EPA REGISTRATION NO.

PRODUCT NAME

APPLICANT'S NAME

DATE GUIDANCE DOCUMENT ISSUED

With respect to the requirement to submit "generic" data imposed by the FIFRA section 3(C)(2)(B) notice contained in the referenced Guidance Document, I am responding in the following manner:

☐ 1. I will submit data in a timely manner to satisfy the following requirements. If the test procedures I will use deviate from (or are not specified in) the Registration Guidelines or the Protocols contained in the Reports of Expert Groups to the Chemicals Group, OECD Chemicals Testing Programme, I enclose the protocols that I will use:

☐ 2. I have entered into an agreement with one or more other registrants under FIFRA section 3(C)(2)(B)(ii) to satisfy the following data requirements. The tests, and any required protocols, will be submitted to EPA by:

NAME OF OTHER REGISTRANT

☐ 3. I enclose a completed "Certification of Attempt to Enter Into an Agreement with Other Registrants for Development of Data" with respect to the following data requirements:

☐ 4. I request that you amend my registration by deleting the following uses (this option is not available to applicants for new products):

☐ 5. I request voluntary cancellation of the registration of this product. (This option is not available to applicants for new products.)

REGISTRANT'S AUTHORIZED REPRESENTATIVE

SIGNATURE

DATE

EPA Form 8580-1 (10-82)

OMB Approval No. 2000-0468 (Expires: 12-31-83)

CERTIFICATION OF ATTEMPT TO ENTER INTO AN AGREEMENT WITH OTHER REGISTRANTS FOR DEVELOPMENT OF DATA

(To qualify, certify ALL four items)

1. I am duly authorized to represent the following firm(s) who are subject to the requirements of a Notice under FIFRA Section 3(c)(2)(B) contained in a Guidance Document to submit data concerning the active ingredient:

GUIDANCE DOCUMENT DATE

ACTIVE INGREDIENT

NAME OF FIRM	EPA COMPANY NUMBER

(This firm or group of firms is referred to below as "my firm".)

2. My firm is willing to develop and submit the data as required by that Notice, if necessary. However, my firm would prefer to enter into an agreement with one or more other registrants to develop jointly, or to share in the cost of developing, the following required items or data:

3. My firm has offered in writing to enter into such an agreement. Copies of the offers are attached. That offer was irrevocable and included an offer to be bound by an arbitration decision under FIFRA Section 3(c)(2)(B)(iii) if final agreement on all terms could not be reached otherwise. This offer was made to the following firm(s) on the following date(s):

NAME OF FIRM	DATE OF OFFER

However, none of those firm(s) accepted my offer.

4. My firm requests that EPA not suspend the registration(s) of my firm's product(s), if any of the firms named in paragraph (3) above have agreed to submit the data listed in paragraph (2) above in accordance with the Notice. I understand EPA will promptly inform me whether my firm must submit data to avoid suspension of its registration(s) under FIFRA Section 3(c)(2)(B). (This statement does not apply to applicants for new products.) I give EPA permission to disclose this statement upon request.

TYPED NAME	SIGNATURE	DATE

EPA Form 8580-6 (10-82)

PRODUCT SPECIFIC DATA REPORT

EPA Registration No.________________ Guidance Document for__________________________

Date______________________________

Registration Guideline No.	Name of Test	Test not required for my product listed above (check below)	I am complying with data requirements by		(For EPA Use Only) Accession Numbers Assigned
			Citing MRID#	Submitting Data (Attached)	
§158.20 PRODUCT CHEMISTRY					
61-1	Identity of ingredients				
61-2	Statement of composition				
61-3	Discussion of formation of ingredients				
62-1	Preliminary analysis				
62-2	Certification of limits				
62-3	Analytical methods for enforcement limits				
63-2	Color				
63-3	Physical state				
63-4	Odor				
63-5	Melting point				
63-6	Boiling point				
63-7	Density, bulk-density, or specific gravity				
63-8	Solubility				
63-9	Vapor pressure				
63-10	Dissociation constant				
63-11	Octanol/water partition coefficient				
63-12	pH				

Registration Guideline No.	Name of Test	Test not required for my product listed above (check below)	I am complying with data requirements by		(For EPA Use Only) Accession Numbers Assigned
			Citing MRID#	Submitting Data (Attached)	
63-13	Stability				
63-14	Oxidizing/reducing reaction				
63-15	Flammability				
63-16	Explodability				
63-17	Storage stability				
63-18	Viscosity				
63-19	Miscibility				
63-20	Corrosion characteristics				
63-21	Dielectric breakdown voltage				
§158.135 TOXICOLOGY					
81-1	Acute oral LD-50, rat				
81-2	Acute dermal LD-50				
81-3	Acute inhalation, LC-50 rat				
81-4	Primary eye irritation, rabbit				
81-5	Primary dermal irritation				
81-6	Dermal sensitization				

§162.10 Labeling requirements.

(a) General--(1) Contents of the label. Every pesticide product shall bear a label containing the information specified by the Act and the regulations in this Part. The contents of a label must show clearly and prominently the following:

(i) The name, brand, or trademark under which the product is sold as prescribed in paragraph (b) of this section;

(ii) The name and address of the producer, registrant, or person for whom produced as prescribed in paragraph (c) of this section;

(iii) The net contents as prescribed in paragraph (d) of this section;

(iv) The product registration number as prescribed in paragraph (e) of this section;

(v) The producing establishment number as prescribed in paragraph (f) of this section;

(vi) An ingredient statement as prescribed in paragraph (g) of this section;

(vii) Warning or precautionary statements as prescribed in paragraph (h) of this section;

(viii) The directions for use as prescribed in paragraph (i) of this section; and

(ix) The use classification(s) as prescribed in paragraph (j) of this section.

(2) Prominence and legibility. (i) All words, statements, graphic representations, designs or other information required on the labeling by the Act or the regulations in this part must be clearly legible to a person with normal vision, and must be placed with such conspicuousness (as compared with other words, statements, designs, or graphic matter on the labeling) and expressed in such terms as to render it likely to be read and understood by the ordinary individual under customary conditions of purchase and use.

(ii) All required label text must:

(A) Be set in 6-point or larger type;

(B) Appear on a clear contrasting background; and

(C) Not be obscured or crowded.

(3) Language to be used. All required label or labeling text shall appear in the English language. However, the Agency may require or the applicant may propose additional text in other languages as is considered necessary to protect the public. When additional text in another language is necessary, all labeling requirements will be applied equally to both the English and other-language versions of the labeling.

(4) Placement of Label--(i) General. The label shall appear on or be securely attached to the immediate container of the

pesticide product. For purposes of this Section, and the misbranding provisions of the Act, "securely attached" shall mean that a label can reasonably be expected to remain affixed during the foreseeable conditions and period of use. If the immediate container is enclosed within a wrapper or outside container through which the label cannot be clearly read, the label must also be securely attached to such outside wrapper or container, if it is a part of the package as customarily distributed or sold.

(ii) Tank cars and other bulk containers--(A) Transportation. While a pesticide product is in transit, the appropriate provisions of 49 CFR Parts 170-189, concerning the transportation of hazardous materials, and specifically those provisions concerning the labeling, marking and placarding of hazardous materials and the vehicles carrying them, define the basic Federal requirements. In addition, when any registered pesticide product is transported in a tank car, tank truck or other mobile or portable bulk container, a copy of the accepted label must be attached to the shipping papers, and left with the consignee at the time of delivery.

(B) Storage. When pesticide products are stored in bulk containers, whether mobile or stationary, which remain in the custody of the user, a copy of the label of labeling, including all appropriate directions for use, shall be securely attached to the container in the immediate vicinity of the discharge control valve.

(5) False or misleading statements. Pursuant to section 2(q)(1)(A) of the Act, a pesticide or a device declared subject to the Act pursuant to § 162.15, is misbranded if its labeling is false or misleading in any particular including both pesticidal and non-pesticidal claims. Examples of statements or representations in the labeling which constitute misbranding include:

(i) A false or misleading statement concerning the composition of the product;

(ii) A false or misleading statement concerning the effectiveness of the product as a pesticide or device;

(iii) A false or misleading statement about the value of the product for purposes other than as a pesticide or device;

(iv) A false or misleading comparison with other pesticides or devices;

(v) Any statement directly or indirectly implying that the pesticide or device is recommended or endorsed by any agency of the Federal Government;

(vi) The name of a pesticide which contains two or more principal active ingredients if the name suggests one or more but not all such principal active ingredients even though the names of the other ingredients are stated elsewhere in the labeling;

(vii) A true statement used in such a way as to give a false or misleading impression to the purchaser;

(viii) Label disclaimers which negate or detract from labeling statements required under the Act and these regulations;

(ix) Claims as to the safety of the pesticide or its ingredients, including statements such as "safe," "nonpoisonous," "noninjurious," "harmless" or "nontoxic to humans and pets" with or without such a qualifying phrase as "when used as directed"; and

(x) Non-numerical and/or comparative statements on the safety of the product, including but not limited to:

(A) "Contains all natural ingredients";

(B) "Among the least toxic chemicals known"

(C) "Pollution approved"

(6) Final printed labeling. (i) Except as provided in paragraph (a)(6)(ii) of this section, final printed labeling must be submitted and accepted prior to registration. However, final printed labeling need not be submitted until draft label texts have been provisionally accepted by the Agency.

(ii) Clearly legible reproductions or photo reductions will be accepted for unusual labels such as those silk-screened directly onto glass or metal containers or large bag or drum labels. Such reproductions must be of microfilm reproduction quality.

(b) Name, brand, or trademark. (1) The name, brand, or trademark under which the pesticide product is sold shall appear on the front panel of the label.

(2) No name, brand, or trademark may appear on the label which:

(i) Is false or misleading, or

(ii) Has not been approved by the Administrator through registration or supplemental registration as an additional name pursuant to § 162.6(b)(4).

(c) Name and address of producer, registrant, or person for whom produced. An unqualified name and address given on the label shall be considered as the name and address of the producer. If the registrant's name appears on the label and the registrant is not the producer, or if the name of the person for whom the pesticide was produced appears on the label, it must be qualified by appropriate wording such as "Packed for ***," "Distributed by ***," or "Sold by ***" to show that the name is not that of the producer.

(d) Net weight or measure of contents. (1) The net weight or measure of content shall be exclusive of wrappers or other materials and shall be the average content unless explicitly stated as a minimum quantity.

(2) If the pesticide is a liquid, the net content statement shall be in terms of liquid measure at 68°F (20°C) and shall be expressed in conventional American units of fluid ounces, pints, quarts, and gallons.

(3) If the pesticide is solid or semisolid, viscous or pressurized, or is a mixture of liquid and solid, the net content statement shall be in terms of weight expressed as avoirdupois pounds and ounces.

(4) In all cases, net content shall be stated in terms of the largest suitable units, i.e., "1 pound 10 ounces" rather than "26 ounces."

(5) In addition to the required units specified, net content may be expressed in metric units.

(6) Variation above minimum content or around an average is permissible only to the extent that it represents deviation unavoidable in good manufacturing practice. Variation below a stated minimum is not permitted. In no case shall the average content of the packages in a shipment fall below the stated average content.

(e) Product registration number. The registration number assigned to the pesticide product at the time of registration shall appear on the label, preceded by the phrase "EPA Registration No.," or the phrase "EPA Reg. No." The registration number shall be set in type of a size and style similar to other print on that part of the label on which it appears and shall run parallel to it. The registration number and the required identifying phrase shall not appear in such a manner as to suggest or imply recommendation or endorsement of the product by the Agency.

(f) Producing establishments registration number. The producing establishment registration number preceded by the phrase "EPA Est.", of the final establishment at which the product was produced may appear in any suitable location on the label or immediate container. It must appear on the wrapper or outside container of the package if the EPA establishment registration number on the immediate container cannot be clearly read through such wrapper or container.

(g) Ingredient statement--(1) General. The label of each pesticide product must bear a statement which contains the name and percentage by weight of each active ingredient, the total percentage by weight of all inert ingredients; and if the pesticide contains arsenic in any form, a statement of the percentages of total and water-soluble arsenic calculated as elemental arsenic. The active ingredients must be designated by the term "active ingredients" and the inert ingredients by the term "inert ingredients," or the singular forms of these terms when appropriate. Both terms shall be in the same type size, be aligned to the same margin and be equally prominent. The statement "Inert Ingredients, none" is not required for pesticides which contain 100 percent active ingredients. Unless the ingredient statement is a complete analysis of the pesticide, the term "analysis" shall not be used as a heading for the ingredient statement.

(2) Position of ingredient statement. (i) The ingredient statement is normally required on the front panel of the label. If there is an outside container or wrapper through which the ingredient statement cannot be clearly read, the ingredient statement must also appear on such outside container or wrapper. If the size or form of the package makes it impracticable to place the ingredient statement on the front panel of the label, permission may be granted for the ingredient statement to appear elsewhere.

(ii) The text of the ingredient statement must run parallel with other text on the panel on which it appears, and must be clearly distinguishable from and must not be placed in the body of other text.

(3) Names to be used in ingredient statement. The name used for each ingredient shall be the accepted common name, if there is one, followed by the chemical name. The common name may be used alone only if it is well known. If no common name has been established, the chemical name alone shall be used. In no case will the use of a trademark or proprietary name be permitted unless such name has been accepted as a common name by the Administrator under the authority of Section 25(c)(6).

(4) Statements of percentages. The percentages of ingredients shall be stated in terms of weight-to-weight. The sum of percentages of the active and the inert ingredients shall be 100. Percentages shall not be expressed by a range of values such as "22-25%." If the uses of the pesticide product are expressed as weight of active ingredient per unit area, a statement of the weight of active ingredient per unit volume of the pesticide formulation shall also appear in the ingredient statement.

(5) Accuracy of stated percentages. The percentages given shall be as precise as possible reflecting good manufacturing practice. If there may be unavoidable variation between manufacturing batches, the value stated for each active ingredient shall be the lowest percentage which may be present.

(6) Deterioration. Pesticides which change in chemical composition significantly must meet the following labeling requirements:

(i) In cases where it is determined that a pesticide formulation changes chemical composition significantly, the product must bear the following statement in a prominent position on the label: "Not for sale or use after [date]."

(ii) The product must meet all label claims up to the expiration time indicated on the label.

(7) Inert ingredients. The Administrator may require the name of any inert ingredient(s) to be listed in the ingredient statement if he determines that such ingredient(s) may pose a hazard to man or the environment.

(h) Warnings and precautionary statements. Required warnings and precautionary statements concerning the general areas of toxicological hazard including hazard to children, environmental hazard, and physical or chemical hazard fall into two groups; those required on the front panel of the labeling and those which may appear elsewhere. Specific requirements concerning content, placement, type size, and prominence are given below.

(1) Required front panel statements. With the exception of the child hazard warning statement, the text required on the front panel of the label is determined by the Toxicity Category of the pesticide. The category is assigned on the basis of the highest hazard shown by any of the indicators in the table below:

Hazard indicators	Toxicity categories			
	I	II	III	IV
Oral LD_{50}	Up to and including 50 mg/kg	From 50 thru 500 mg/kg	From 500 thru 5000 mg/kg	Greater than 5000 mg/kg
Inhalation LC_{50}	Up to and including .2 mg/liter	From .2 thru 2 mg/liter	From 2 thru 20 mg/liter	Greater than 20 mg/liter
Dermal LD_{50}	Up to and including 200 mg/kg	From 200 thru 2000	From 2,000 thru 20,000	Greater than 20,000
Eye effects	Corrosive; corneal opacity not reversible within 7 days	Corneal opacity reversible within 7 days; irritation persisting for 7 days	No corneal opacity; irritation reversible within 7 days	No irritation
Skin effects	Corrosive	Severe irritation at 72 hours	Moderate irritation at 72 hours	Mild or slight irritation at 72 hours

(i) Human hazard signal word.--(A) Toxicity Category I. All pesticide products meeting the criteria of Toxicity Category I shall bear on the front panel the signal word "Danger." In addition if the product was assigned to Toxicity Category I on the basis of its oral, inhalation or dermal toxicity (as distinct from skin and eye local effects) the word "Poison" shall appear in red on a background of distinctly contrasting color and the skull and crossbones shall appear in immediate proximity to the word "poison."

(B) Toxicity Category II. All pesticide products meeting the criteria of Toxicity Category II shall bear on the front panel the signal word "Warning."

(C) Toxicity Category III. All pesticide products meeting the criteria of Toxicity Category III shall bear on the front panel the signal word "Caution."

(D) Toxicity Category IV. All pesticide products meeting the criteria of Toxicity Category IV shall bear on the front panel the signal word "Caution."

(E) Use of signal words. Use of any signal word(s) associated with a higher Toxicity Category is not permitted except when the Agency determines that such labeling is necessary to prevent unreasonable adverse effects on man or the environment. In no case shall more than one human hazard signal word appear on the front panel of a label.

(ii) Child hazard warning. Every pesticide product label shall bear on the front panel the statement "keep out of reach of children." Only in cases where the likelihood of contact with children during distribution, marketing, storage or use is demonstrated by the applicant to be extremely remote, or if the nature of the pesticide is such that it is approved for use on infants or small children, may the Administrator waive this requirement.

(iii) Statement of practical treatment--(A) Toxicity Category I. A statement of practical treatment (first aid or other) shall appear on the front panel of the label of all pesticides falling into Toxicity Category I on the basis of oral, inhalation or dermal toxicity. The Agency may, however, permit reasonable variations in the placement of the statement of practical treatment is some reference such as "See statement of practical treatment on back panel" appears on the front panel near the word "Poison" and the skull and crossbones.

(B) Other toxicity categories. The statement of practical treatment is not required on the front panel except as described in paragraph (h)(1)(iii)(A) of this section. The applicant may, however, include such a front panel statement at his option. Statements of practical treatment are, however, required elsewhere on the label in accord with paragraph (h)(2) of this section if they do not appear on the front panel.

(iv) Placement and prominence. All the required front panel warning statements shall be grouped together on the label, and shall appear with sufficient prominence relative to other front panel text and graphic material to make them unlikely to be overlooked under customary conditions of purchase and use. The following table shows the minimum type size requirements for the front panel warning statements on various sizes of labels:

Size of label front panel in square inches	Points	
	Required signal word, all capitals	"Keep out of reach of Children"
5 and under	6	6
Above 5 to 10	10	6
Above 10 to 15	12	8
Above 15 to 30	14	10
Over 30	18	12

(2) Other required warnings and precautionary statements. The warnings and precautionary statements as required below shall appear together on the label under the general heading "Precautionary Statements" and under appropriate subheadings of "Hazard to Humans and Domestic Animals," "Environmental Hazard" and "Physical or Chemical Hazard."

(i) Hazard to humans and domestic animals. (A) Where a hazard exists to humans or domestic animals, precautionary statements are required indicating the particular hazard, the route(s) of exposure and the precautions to be taken to avoid accident, injury or damage. The precautionary paragraph shall be immediately preceded by the appropriate hazard signal word.

(B) The following table depicts typical precautionary statements. These statements must be modified or expanded to reflect specific hazards.

Toxicity category	Precautionary statements by toxicity category	
	Oral, inhalation, or dermal toxicity	Skin and eye local effects
I . . .	Fatal (poisonous) if swallowed [inhaled or absorbed through skin]. Do not breathe vapor [dust] or spray mist]. Do not get in eyes, on skin, or on clothing [Front panel statement of practical treatment required.].	Corrosive, causes eye and skin damage [or skin irritation]. Do not get in eyes, on skin, or on clothing. Wear goggles or face shield and rubber gloves when handling. Harmful or fatal if swallowed. [Appropriate first aid statement required.]
II . . .	May be fatal if swallowed [inhaled or absorbed through the skin]. Do not breathe vapors [dust or spray mist]. Do not get in eyes, on skin, or on clothing. [Appropriate first aid statements required.].	Causes eye [and skin] irritation. Do not get in eyes, on skin, or on clothing. Harmful if swallowed. [Appropriate first aid statement required.].
III . . .	Harmful if swallowed [inhaled or absorbed through the skin]. Avoid breathing vapors [dust or spray mist]. Avoid contact with skin [eyes or clothing]. [Appropriate first aid statement required.].	Avoid contact with skin, eyes or clothing. In case of contact immediately flush eyes or skin with plenty of water. Get medical attention if irritation persists.
IV . . .	[No precautionary statements required.].	[No precautionary statements required.].

(ii) Environmental hazards. Where a hazard exists to non-target organisms excluding humans and domestic animals, precautionary statements are required stating the nature of the hazard and the appropriate precautions to avoid potential accident, injury or damage. Examples of the hazard statements and the circumstances under which they are required follow:

(A) If a pesticide intended for outdoor use contains an active ingredient with a mammalian acute oral LD_{50} of 100 or less, the statement "This Pesticide is Toxic to Wildlife" is required.

(B) If a pesticide intended for outdoor use contains an active ingredient with a fish acute LC_{50} of 1 ppm or less, the statement "This Pesticide is Toxic to Fish" is required.

(C) If a pesticide intended for outdoor use contains an active ingredient with an avian acute oral LD_{50} of 100 mg/kg or less, or a subacute dietary LC_{50} of 500 ppm or less, the statement "This Pesticide is Toxic to Wildlife" is required.

(D) If either accident history or field studies demonstrate that use of the pesticide may result in fatality to birds, fish or mammals, the statement "This pesticide is extremely toxic to wildlife (fish)" is required.

(E) For uses involving foliar application to agricultural crops, forests, or shade trees, or for mosquito abatement treatments, pesticides toxic to pollinating insects must bear appropriate label cautions.

(F) For all outdoor uses other than aquatic applications the label must bear the caution "Keep out of lakes, ponds or streams. Do not contaminate water by cleaning of equipment or disposal of wastes."

(iii) Physical or chemical hazards. Warning statements on the flammability or explosive characteristics of the pesticide are required as follows:

Flash point	Required text
(A) PRESSURIZED CONTAINERS	
Flash point at or below 20°F; if there is a flashback at any valve opening.	Extremely flammable. Contents under pressure. Keep away from fire, sparks, and heated surfaces. Do not puncture or incinerate container. Exposure to temperatures above 130°F may cause bursting.
Flash point above 20°F and not over 80°F or if the flame extension is more than 18 in. long at a distance of 6 in. from the flame.	Flammable. Contents under pressure. Keep away from heat, sparks, and open flame. Do not puncture or incinerate container. Exposure to temperatures above 130°F may cause bursting.
All other pressurized containers	Contents under pressure. Do not use or store near heat or open flame. Do not puncture or incinerate container. Exposure to temperatures above 130°F may cause bursting.
(B) NONPRESSURIZED CONTAINERS	
At or below 20°F	Extremely flammable. Keep away from fire, sparks, and heated surfaces.
Above 20°F and not over 80°F	Flammable. Keep away from heat and open flame.
Above 80°F and not over 150°F	Do not use or store near heat or open flame.

(i) Directions for Use--(1) General requirements--(i) Adequacy and clarity of directions. Directions for use must be stated in terms which can be easily read and understood by the average person likely to use or to supervise the use of the pesticide. When followed, directions must be adequate to protect the public from fraud and from personal injury and to prevent unreasonable adverse effects on the environment.

(ii) Placement of directions for use. Directions may appear on any portion of the label provided that they are conspicuous enough to be easily read by the user of the pesticide product. Directions for use may appear on printed or graphic matter which accompanies the pesticide provided that:

(A) If required by the Agency, such printed or graphic matter is securely attached to each package of the pesticide, or placed within the outside wrapper or bag;

(B) The label bears a reference to the directions for use in accompanying leaflets or circulars, such as "See directions in the enclosed circular." and

(C) The Administrator determines that it is not necessary for such directions to appear on the label.

(iii) Exceptions to requirement for direction for use--(A) Detailed directions for use may be omitted from labeling of pesticides which are intended for use only by manufacturers of products other than pesticide products in their regular manufacturing processes, provided that:

(1) The label clearly shows that the product is intended for use only in manufacturing processes and specifies the type(s) of products involved.

(2) Adequate information such as technical data sheets or bulletins, is available to the trade specifying the type of product involved and its proper use in manufacturing processes;

(3) The product will not come into the hands of the general public except after incorporation into finished products; and

(4) The Administrator determines that such directions are not necessary to prevent unreasonable adverse effects on man or the environment.

(B) Detailed directions for use may be omitted from the labeling of pesticide products for which sale is limited to physicians, veterinarians, or druggists, provided that:

(1) The label clearly states that the product is for use only by physicians or veterinarians;

(2) The Administrator determines that such directions are not necessary to prevent unreasonable adverse effects on man or the environment; and

(3) The product is also a drug and regulated under the provisions of the Federal Food, Drug and Cosmetic Act.

(C) Detailed directions for use may be omitted from the labeling of pesticide products which are intended for use only by formulators in preparing pesticides for sale to the public, provided that:

(1) There is information readily available to the formulators on the composition, toxicity, methods of use, applicable restrictions or limitations, and effectiveness of the product for pesticide purposes;

(2) The label clearly states that the product is intended for use only in manufacturing, formulating, mixing, or repacking for use as a pesticide and specifies the type(s) of pesticide products involved;

(3) The product as finally manufactured, formulated, mixed, or repackaged is registered; and

(4) The Administrator determines that such directions are not necessary to prevent unreasonable adverse effects on man or the environment.

(2) Contents of Directions for Use. The directions for use shall include the following, under the headings "Directions for Use":

(i) The statement of use classification as prescribed in 162.10(j) immediately under the heading "Directions for Use."

(ii) Immediately below the statement of use classification, the statement "It is a violation of Federal law to use this product in a manner inconsistent with its labeling."

(iii) The site(s) of application, as for example the crops, animals, areas, or objects to be treated.

(iv) The target pest(s) associated with each site.

(v) The dosage rate associated with each site and pest.

(vi) The method of application, including instructions for dilution, if required, and type(s) of application apparatus or equipment requried.

(vii) The frequency and timing of applications necessary to obtain effective results without causing unreasonable adverse effects on the environment.

(viii) Specific limitations on reentry to areas where the pesticide has been applied, meeting the requirements concerning reentry provided by 40 CFR Part 170.

(ix) Specific directions concerning the storage and disposal of the pesticide and its container, meeting the requirements of 40 CFR Part 165. These instructions shall be grouped and appear under the heading "Storage and Disposal." This heading must be set in type of the same minimum sizes as required for the child hazard warning (See Table in § 162.10(h)(1)(iv).)

(x) Any limitations or restrictions on use required to prevent unreasonable adverse effects, such as:

(A) Required intervals between application and harvest of food or feed crops.

(B) Rotational crop restrictions.

(C) Warnings as required against use on certain crops, animals, objects, or in or adjacent to certain areas.

(D) [Reserved]

(E) For restricted use pesticides, a statement that the pesticide may be applied under the direct supervision of a certified applicator who is not physically present at the site of application but nonetheless available to the person applying the pesticide, unless the Agency has determined that the pesticide may only be applied under the direct supervision of a certified applicator who is physically present.

(F) Other pertinent information which the Administrator determines to be necessary for the protection of man and the environment.

(j) Statement of Use Classification. By October 22, 1976, all pesticide products must bear on their labels a statement of use classification as described in paragraphs (j)(1) and (2) of this section. Any pesticide product for which some uses are classified for general use and others for restricted use shall be separately labeled according to the labeling standards set forth in this subsection, and shall be marketed as separate products with different registration numbers, one bearing directions only for general use(s) and the other bearing directions for restricted use(s) except that, if a product has both restricted use(s) and general use(s), both of these uses may appear on a product labeled for restricted use. Such products shall be subject to the provisions of § 162.10(j)(2).

(1) General Use Classification. Pesticide products bearing directions for use(s) classified general shall be labeled with the exact words "General Classification" immediately below the heading "Directions for Use." And reference to the general classification that suggests or implies that the general utility of the pesticide extends beyond those purposes and uses contained in the Directions for Use will be considered a false or misleading statement under the statutory definitions of misbranding.

(2) Restricted Use Classification. Pesticide products bearing direction for use(s) classified restricted shall bear statements of restricted use classification on the front panel as described below:

(i) Front panel statement of restricted use classification. (A) At the top of the front panel of the label, set in type of the same minimum sizes as required for human hazard signal words (see table in § 162.10(h)(1)(iv)), and appearing with sufficient prominence relative to other text and graphic material on the front panel to make it unlikely to be overlooked under customary conditions of purchase and use, the statement "Restricted Use Pesticide" shall appear.

(B) Directly below this statement on the front panel, a summary statement of the terms of restriction imposed as a precondition to registration shall appear. If use is restricted to certified applicators, the following statement is required: "For retail sale to and use only by Certified Applicators or persons under their direct supervision and only for those uses covered by the Certified Applicator's certification." If, however, other regulatory restrictions are imposed, the Administrator will define the appropriate wording for the terms of restriction by regulation.

(k) Advertising. [Reserved]

[40 FR 28268, July 3, 1975; 40 FR 32329, Aug. 1, 1975; 40 FR 38571, Aug. 21, 1975, as amended at 43 FR 5786, Feb. 9, 1978]

APPENDIX IV-2

LABELING REQUIREMENTS OF THE FIFRA, AS AMENDED

ITEM	LABEL ELEMENT	APPLICABILITY OF REQUIREMENT	PLACEMENT ON LABEL		COMMENTS
			REQUIRED	PREFERRED	
1	Product name	All products	Front panel	Center front panel	
2	Company name and address	All products	None	Bottom front panel or end of label text	If registrant is not the producer, must be qualified by "Packed for . . .," "Distributed by. . .," etc.
3	Net contents	All products	None	Bottom front panel or end of label text	May be in metric units in addition to U.S. units
4	EPA Reg. No.	All products	None	Front panel	Must be in similar type size and run parallel to other type.
5	EPA Est. No.	All products	None	Front panel, immediately before or following Reg. No.	May appear on the container instead of the label.
6A	Ingredients statement	All products	Front panel	Immediately following product name	Text must run parallel with other text on the panel.
6B	Pounds/gallon statement	Liquid products where dosage given as lbs. ai/unit area	Front panel	Directly below the main ingredients statement	
7	Front panel precautionary statements	All products	Front panel		All front panel precautionary statements must be grouped together, preferably blocked.
7A	Keep Out of Reach of Children (Child hazard warning)	All products	Front panel	Above signal word	Note type size requirements.
7B	Signal word	All products	Front panel	Immediately below child hazard warning	Note type size requirements.

ITEM	LABEL ELEMENT	APPLICABILITY OF REQUIREMENT	PLACEMENT ON LABEL		COMMENTS
			REQUIRED	PREFERRED	
7C	Skull & crossbones and word POISON (in red)	All products which are Category I based on oral, dermal, or inhalation toxicity	Front panel	Both in close proximity to signal word	
7D	Statement of practical treatment	All products in Categories I, II, and III	Category I: Front panel unless referral statement is used. Others: Grouped with side panel precautionary statements.	Front panel for all.	
7E	Referral statement	All products where precautionary labeling appears on other than front panel.	Front panel		
8	Side/back panel precautionary statements	All products	None	Top or side of back panel preceding directions for use	Must be grouped under the headings in 8A, 8B, and 8C; preferably blocked.
8A	Hazards to humans and domestic animals	All products in Categories I, II, and III	None	Same as above	Must be preceded by appropriate signal word.
8B	Environmental hazards	All products	None	Same as above	Environmental hazards include bee caution where applicable.

ITEM	LABEL ELEMENT	APPLICABILITY OF REQUIREMENT	PLACEMENT ON LABEL		COMMENTS
			REQUIRED	PREFERRED	
8C	Physical or chemical hazards	All pressurized products, others with flash points under 150°F	None	Same as above	
9A	Restricted block	All restricted products	Top center of front panel	Preferably blocked	Includes a statement of the terms of restriction. The words "RESTRICTED USE PESTICIDE" must be same type size as signal word.
9C	Misuse statement	All products	Immediately following heading of directions for use		
10A	Reentry statement	All cholinesterase inhibitors	In the directions for use	Immediately after misuse statement	
10C	Storage and disposal block	All products	In the directions for use	Immediately before specific directions for use or at the end of directions for use	Must be set apart and clearly distinguishable from from other directions for use.
10D	Directions for use	All products	None	None	May be in metric as well as U.S. units

PHYSICAL-CHEMICAL HAZARDS

Criteria	Required Label Statement
I. Pressurized Containers	
A. Flashpoint at or below 20°F; or if there is a flashback at any valve opening.	Extremely flammable. Contents under pressure. Keep away from fire, sparks, and heated surfaces. Do not puncture or incinerate container. Exposure to temperatures above 130°F may cause bursting.
B. Flashpoint above 20°F and not over 80°F; or if the flame extension is more than 18 inches long at a distance of 6 inches from the valve opening.	Flammable. Contents under pressure. Keep away from heat, sparks, and flame. Do not puncture or incinerate container. Exposure to temperatures above 130°F may cause bursting.
C. ALL OTHER PRESSURIZED CONTAINERS	Contents under pressure. Do not use or store near heat or open flame. Do not puncture or incinerate container. Exposure to temperatures above 130°F may cause bursting.
II. Non-Pressurized Containers	
A. Flashpoint at or below 20°F.	Extremely flammable. Keep away from fire, sparks, and heated surfaces.
B. Flashpoint above 20°F and not over 80°F.	Flammable. Keep away from heat and open flame.
C. Flashpoint over 80°F and not over 150°F.	Do not use or store near heat and open flame.
D. Flashpoint above 150°F.	None required.

Appendix IV-4

STORAGE AND DISPOSAL INSTRUCTIONS FOR PESTICIDES

All products are required to bear specific label instructions about storage and disposal. Storage and disposal instructions must be grouped together in the directions for use portion of the label under the heading STORAGE AND DISPOSAL. Products intended solely for domestic use need not include the heading "STORAGE AND DISPOSAL." The STORAGE AND DISPOSAL heading must appear in the minimum type size listed below:

Size of label front panel in square inches	Required type size for the heading STORAGE AND DISPOSAL (all capitals)
10 and under	.6 point
Above 10 to 15	.8 point
Above 15 to 30	10 point
Over 30	12 point

Storage and disposal instructions must be set apart and clearly distinguishable from other directions for use. Blocking storage and disposal statements with a solid line is suggested as a means of increasing their prominence.

A. Storage Instructions:

All product labels are required to have appropriate storage instructions. Specific storage instructions are not prescribed. Each registrant must develop his own storage instructions, considering, when applicable, the following factors:

1. Conditions of storage that might alter the composition or usefulness of the pesticide. Examples could be temperature extremes, excessive moisture or humidity, heat, sunlight, friction, or contaminating substances or media.
2. Physical requirements of storage which might adversely affect the container of the product and its ability to continue to function properly. Requirements might include positioning of the container in storage, storage or damage due to stacking, penetration of moisture, and ability to withstand shock or friction.
3. Specifications for handling the pesticide container, including movement of container within the storage area, proper opening and closing procedures (particularly for opened containers), and measures to minimize exposure while opening or closing container.

4. Instructions on what to do if the container is damaged in any way, or if the pesticide is leaking or has been spilled, and precautions to minimize exposure if damage occurs.

5. General precautions concerning locked storage, storage in original container only, and separation of pesticides during storage to prevent cross-contamination of other pesticides, fertilizer, food, and feed.

6. General storage instructions for household products should emphasize storage in original container and placement in locked storage areas.

B. Pesticide Disposal Instructions:

The label of all products, except those intended solely for domestic use, must bear explicit instructions about pesticide disposal. The statements listed below contain the exact wording that must appear on the label of these products:

1. The labels of all products, except domestic use, must contain the statement, "Do not contaminate water, food, or feed by storage or disposal."

2. Except those products intended solely for domestic use, the labels of all products that contain active ingredients appearing on the "Acutely Hazardous" Commercial Pesticide Products List (RCRA "E" List) at the end of this appendix or are assigned to Toxicity Category I on the basis of oral or dermal toxicity, skin or eye irritation potential, or Toxicity Category I or II on the basis of acute inhalation toxicity must bear the following pesticide disposal statement:

   "Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal Law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance."

   The labels of all products, except those intended for domestic use, containing active or inert ingredients that appear on the "Toxic" Commercial Pesticide Products List (RCRA "F" List) at the end of this appendix or presently meet any of the criteria in Subpart C, 40 CFR 261 for a hazardous waste must bear the following pesticide disposal statement:

"Pesticide wastes are toxic. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal Law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance."

Labels for all other products, except those intended for domestic use, must bear the following pesticide disposal statement:

"Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility."

3. Products intended for domestic use only must bear the following disposal statement: "Securely wrap original container in several layers of newspaper and discard in trash."

C. Container Disposal Instructions

The label of each product must bear container disposal instructions appropriate to the type of container.

1. All products intended for domestic use must bear one of the following container disposal statements:

Container Type	Statement
Non-aerosol products (bottles, cans, jars)	Do not reuse container (bottle, can, jar). Rinse thoroughly before discarding in trash.
Non-aerosol products (bags)	Do not reuse bag. Discard bag in trash.
Aerosol products	Replace cap and discard containers in trash. Do not incinerate or puncture.

Pesticides that are hazardous wastes under 40 CFR 261.33(e) and (f) when discarded.

"Acutely Hazardous" Commercial Pesticides (RCRA "E" List) Active Ingredients, (no inerts):

Acrolein
Aldicarb
Aldrin
Allyl alcohol
Aluminum phosphide
4-Aminopyridine
Arsenic acid
Arsenic pentoxide
Arsenic trioxide
Calcium cyanide
Carbon disulfide
p-Chloroaniline
Cyanides (soluble cyanide salts, not specified elsewere)
Cyanogen chloride
2-Cyclohexyl-4,6-dinitrophenol
Dieldrin
0,0-Diethyl S-[2-ethylthio)ethyl] phosphorodithioate
    (disulfoton, Di-Syston)
0,0-Diethyl 0-pyrazinyl phosphorothioate (Zinophos)
Dimethoate
0,0-Dimethyl 0-p-nitrophenyl phosphorothioate (methyl parathion)
4,6-Dinitro-o-cresol and salts
4,6-Dinitro-o-cyclohexylphenol
2,4 Dinitrophenol
Dinoseb
Endosulfan
Endothall
Endrin
Famphur
Fluoroacetamide
Heptachlor
Hexanethyl tetraphosphate
Hydrocyanic acid
Hydrogen cyanide
Methomyl
alpha-Naphthylthiourea (ANTU)
Nicotine and salts
Octamethylpyrophosphoramide (OMPA, schradan)
Parathion

"Acutely Hazardous" Commercial Pesticides (RCRA "E" List)
Active Ingredients continued:

Phenylmercuric acetate (PMA)
Phorate
Potassium cyanide
Propargyl alcohol
Sodium azide
Sodium cyanide
Sodium fluoroacetate
Strychnine and salts
0,0,0,0-Tetraethyl dithiopyrophosphate (sulfotepp)
Tetraethyl pyrophosphate
Thallium sulfate
Thiofanox
Toxaphene
Warfarin
Zinc phosphide

"Toxic" Commercial Pesticide Products (RCRA "F" List)
Active Ingredients:

Acetone
Acrylonitrile
Amitrole
Benzene
Bis(2-ethylhexyl)pthalate
Cacodylic acid
Carbon tetrachloride
Chloral (hydrate)
Chlordane (technical)
Chlorobenzene
4-Chloro-m-cresol
Chloroform
o-Chlorophenol
4-Chloro-o-toluidine hydrochloride
Creosote
Cresylic acid
Cyclohexane
Decachlorooctahydro-1,3,4-metheno-2H-cyclobuta[c,d]-pentalen-2-one
    (kepone, chlordecone)
1,2-Dibromo-3-chloropropane (DBCP)
Dibutyl phthalate
S-3,3-(Dichloroallyl diisopropylthiocarbamate (diallate, Avadex)
o-Dichlorobenzene
p-Dichlorobenzene
Dichlorodifluoromethane (Freon 12®)
3,5-Dichloro-N-(1,1-dimethyl-2-propynyl) benzamide (pronamide,Kerb)
Dichloro diphenyl dichloroethane (DDD)
Dichloro diphenyl trichloroethane (DDT)
Dichlorethyl ether
2,4-Dichlorophenoxyacetic, esters and salts (2,4-D)
1,2-Dichloropropane
1,3-Dichloropropane (Telone)
Dimethyl phthalate
Ethyl acetate
Ethyl 4,4'-dichlorobenzilate (chlorobenzilate)
Ethylene dibromide (EDB)
Ethylene dichloride
Ethylene oxide
Formaldehyde
Furfural
Hexachlorobenzene
Hexachlorocyclopentadiene
Hexachloroethane
Hydrofluoric acid

"Toxic" Commercial Pesticide Products (RCRA "F" List)
Active Ingredients:

Isobutyl alcohol
Lead acetate
Lindane
Maleic hydrazide
Mercury
Methyl alcohol
Methyl bromide
Methyl chloride
2,2'-Methylenebis (3,4,6-trichlorophenol) (hexachlorophene)
Methylene chloride
Methyl ethyl ketone
4-Methyl-2-pentanone (methyl isobutyl ketone)
Naphthalene
Nitrobenzene
p-Nitrophenol
Pentachloroethane
Pentachloronitrobenzene (PCNB)
Pentaclorophenol
Phenol
Phosphorodithioic acid, 0,0-diethyl, methyl ester
Propylene dichloride
Pyridine
Resorcinol
Safrole
Selenium disulfide
Silvex
1,2,4,5-Tetrachlorobenzene
1,1,2,2-Tetrachloroethane
Tetrachloroethylene
2,3,4,6-Tetrachlorophenol
Thiram
Toluene
1,1,1-Trichloroethane
Trichloroethylene
Trichloromonofluoromethane (Freon 11®)
2,4,5-Trichlorophenol
2,4,6-Trichlorophenol
2,4,5-Trichlorophenoxyacetic acid (2,4,5-T)
Xylene

Appendix IV-4
(continued)

"Toxic" Commercial Pesticide Products (RCRA "F" List)

Inert Ingredients:

Acetone
Acetonitrile
Acetophenone
Acrylic acid
Aniline
Benzene
Chlorobenzene
Chloroform
Cyclohexane
Cyclohexanone
Dichlorodifluoromethane (Freon 12®)
Diethyl phthalate
Dimethylamine
Dimethyl phthalate
1,4-Dioxane
Ethylene oxide
Formaldehyde
Formic acid
Isobutyl alcohol
Meleic anhydride
Methyl alcohol (methanol)
Methyl ethyl ketone
Methyl methacrylate
Naphthalene
Saccharin and salts
Thiourea
Toluene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichlorofluoromethane (Freon 11®)
Vinyl chloride
Xylene